

# MINING WORLD



*in this issue*

**How  $U_3O_8$  Ore Is Milled at Bluewater**

*Page 34*

**AUGUST 1954**

**Vol. 16 No. 9**

35 cents a copy  
in sterling 3s



PRODUCTION UP PER MAN SHIFT using Eimco Model 21 Rocker Shovels in production mining. Eimcos, always the leaders, in development headings are now being used by aggressive mining companies for production with increased tonnage as the result.

**THE EIMCO CORPORATION**

Salt Lake City, Utah, U.S.A.  
Export Office: Eimco Bldg., 52 South St., New York City

# Proving its mettle

## IN A RUGGED LAND OF IRON

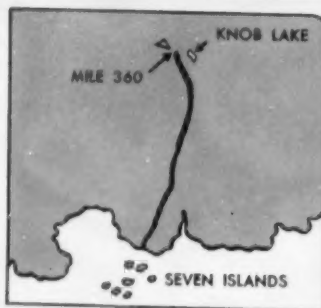


GM DIESEL  
CASE HISTORY No. 53-233

**USER:** Iron Ore Company of Canada

**INSTALLATION:** 12 GM Diesel-powered 34-ton Euclid IFFD trucks and 5 Allis-Chalmers HD-20 tractors used to strip and haul at Knob Lake. Part of a fleet of more than 200 GM Diesel engines powering all types of equipment for I.O.C.

**PERFORMANCE:** "They're doing a wonderful job," said Master Mechanic "Jock" Marshall. "Equipment takes a real licking up here, and GM Diesels stand up under it."



## More than 200 GM Diesel Engines on vast Ungava Project

Up at "the Knob," 360 miles above Seven Islands terminal, the Iron Ore Company of Canada relies on General Motors Diesel-powered equipment—just as it has in construction of railroad, dams and facilities all along the line.

The big double-engine "Euc" and HD-20 shown above are benching access road to the rich Ruth Lake #3 deposit, first in the area to be opened for mining. They are part of a GM Diesel-powered fleet that proved its mettle by "walking" to the end of the line under its own power—a 250-mile trek over frozen tundra in blizzards and temperatures that reached 40° below zero.

These quicker-starting, faster-accelerating 2-cycle Diesels have been delivering trouble-free performance on double-shift, 20-hour-a-day schedules ever since they arrived—a tribute to both their rugged stamina and I.O.C.'s excellent preventative maintenance program.

Whatever your need for power—in trucks, tractors, air compressors, cranes, shovels—why not learn firsthand how much more profitably and dependably this versatile GM 2-cycle Diesel can deliver it? There is a GM Diesel distributor near you who will gladly give you all the facts—and you can count on him for prompt, efficient parts supply and service wherever you are.

### DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

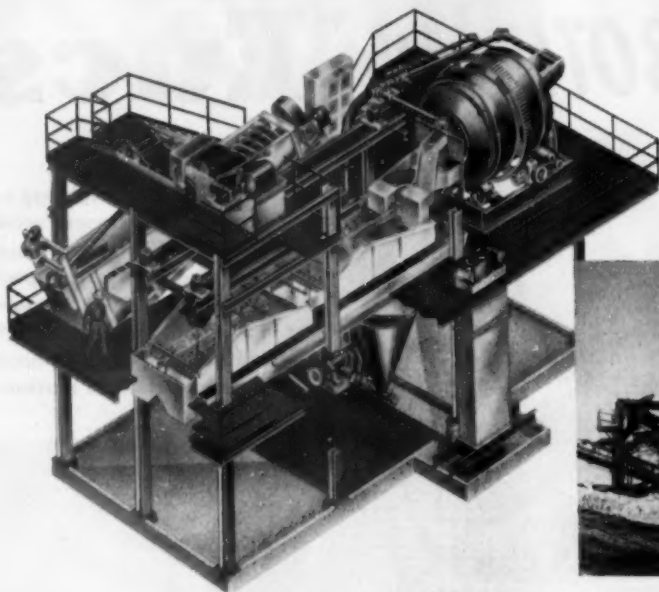
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

**It pays to STANDARDIZE on**

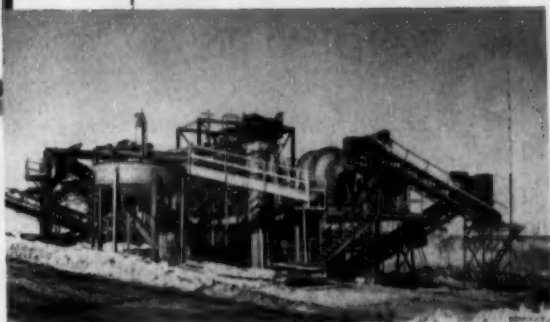
. . . available in more than 750 models of equipment built by over 150 manufacturers.



# WEMCO MOBIL-MILLS



**are built  
to your  
exact needs**



For treating **any** ore amenable to Heavy-Media Separation — you should investigate the profit factors of a Wemco Mobil-Mill. Under widely varying conditions and capacities, Wemco Mobil-Mills are consistently making high economic recoveries at low operating costs in more than 50% of the world's HMS installations. Here are reasons why it can do the same for you:

**PREFABRICATED** — for quick, low-cost field assembly in minimum time by Wemco or your own crews.

**FLEXIBLE DESIGN** — engineered with a choice of components in combinations to suit your ore characteristics.

**MINIMUM FIRST COST** — comparatively small capital investment per ton of capacity.

**LOW OPERATING COSTS** — as low as 15 cents per ton of feed.

## MOBIL-MILLS HAVE:

### WIDE APPLICATION

- as complete production plants for economic extraction of the valuable mineral from ore.
- as pre-concentration units to increase capacity of other concentration processes.
- as temporary concentrators for profitable recovery of tailings and low grade deposits.
- as pilot plants to investigate the feasibility and economy of Heavy-Media Separation.

### FLEXIBILITY

- a size and model for every need — built to order for you.
- choice of 3 types of separators — Cone, Single Drum or Two-Compartment Drum.
- easily dismantled and relocated at minimum expense.
- available on rental, rental with option to buy, or outright purchase basis.

# WEMCO

WESTERN MACHINERY COMPANY

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Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps • Agitators  
Cone Separators • Drum Separators • Hydroseparators • Fagergren Laboratory Units  
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Write for Bulletin M-3-M-5 and further information on Mobil-Mill applications for your particular operation.

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# High Production and Lower Maintenance— *You Get BOTH with "Eucs"*



Built for tough off-the-highway service, Rear-Dump Euclids have increased production and reduced hauling costs on scores of open pit mining and quarry operations. Ability to deliver "plus" performance year in and year out has made "Eucs" the accepted standard for comparison . . . here are some of the reasons why:

## **RUGGED SIMPLICITY**

Designed and built for long life and low maintenance cost. All of Euclid's experience and facilities are devoted to specialized off-the-highway earth moving equipment.

## **CAPACITY**

Euclids have payload capacities of 10, 15, 22, 34 and 50 tons. Because they are matched to various sizes of loading and crushing equipment, "Eucs" provide a well balanced operation for open pit haulage and increase the efficiency of the loading unit.

## **POWER AND SPEED**

Powered by diesel engines of 125 to 600 h.p. "Eucs" have top speeds with full payload, up to 36 m.p.h. Five and ten speed transmission, or torque converter with semi-automatic transmission available. The favorable ratio of horsepower to payload means more pay tons hauled every trip.

## **VERSATILITY**

"Eucs" are efficient for moving any material on any length of haul; handle overburden, rock, coal, ore and other materials loaded by shovels, draglines, transfer hoppers and mobile loading equipment.

If you are interested in higher production at lower cost, have your nearby Euclid Distributor show you what "Eucs" are doing on work similar to yours. He'll be glad to make a hauling cost estimate for your job—no obligation, of course.



**EUCLID DIVISION**

GENERAL MOTORS CORPORATION, Cleveland 17, Ohio  
Cable Yuklid - Code Bentley



# **Euclid Equipment**

FOR MOVING EARTH, ROCK, COAL AND ORE





# MINING WORLD

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 16

**AUGUST 1954**

NUMBER 9

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**COVER CIRCLE:** Another truck-load of uranium ore is dumped at Anaconda's new mill at Bluewater, New Mexico. A sodium carbonate leach is currently being used to handle the high-lime ores, but facilities will soon be enlarged so that sandstone ores may be treated.

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installation  
a **SNAP!**



In just 10 seconds this patented snap-on coupling joins lengths of flexible ventilation tubing. And, only Mine-Vent Tubing has it! Faster coupling and easy hanging of Mine-Vent means fresh air always where and when you need it . . . at the face, immediately after blasting . . . a constant supply of fresh air to keep working energies at peak capacity. For new ventilation efficiency — lower production costs — write your needs to **AMERICAN BRATTICE CLOTH CORP.**, 230 Buffalo St., Warsaw, Indiana

"Canned"  
for your  
convenience

Durable, easy-to-handle fiber drums keeps Mine Vent in perfect condition until you need it

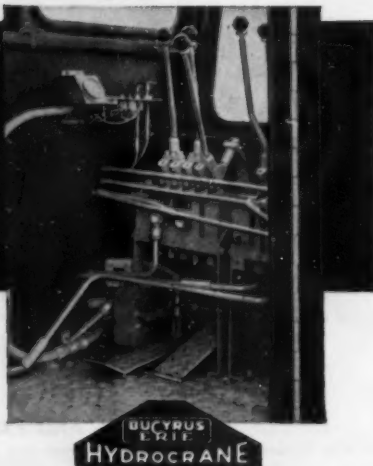


**MineVent**  
**Tubing**



**BUCYRUS-ERIE presents**  
**NEW UP-RATED SELF-POWERED**  
**HYDROCRANE**  
**with selector valve**

Now Bucyrus-Erie offers a new, more powerful all-hydraulic crane-excavator—the self-powered H-3 Hydrocrane. Taking its power from its own 4-cylinder industrial engine instead of from the truck engine, the new self-powered Hydrocrane provides the following big advantages:



1. **Increased horsepower** through eliminating restrictive influence of side-mounted truck power take-off.
2. **Selector valve operation.** Power concentration selector unit permits channeling hydraulic fluid from all three pumps to one valve bank—increases line speeds up to 50%.
3. **Convenient operation.** Selector valve is foot operated—provides metered control of higher speeds—operator need not let go of hoist and swing levers to operate selector valve. Controls for power plant conveniently grouped at operator's station.
4. **Reduced crane maintenance** from simpler more direct power application. High pressure hoses through center pin leading from pumps to valve bank eliminated. Fewer belts, shafts, and hoses.
5. **Improved efficiency.** Improved oil filtering with less restriction. Better cold weather performance.
6. **Improved truck engine life.** Economy results from fewer truck repair bills. Generator for independent power plant re-charges motor truck battery. Overall fuel consumption is less.

1H54

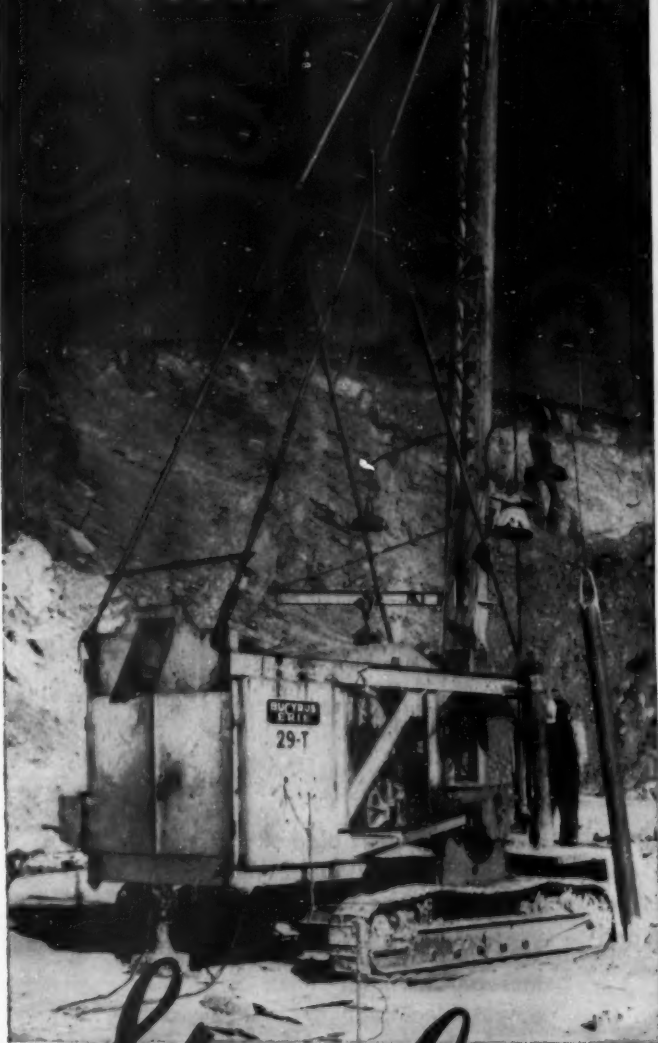
These are just a few of the advantages of the new self-powered Hydrocrane—and self-power is just one of the big features that is making the Hydrocrane foremost in 1954. See your distributor for complete details.

**Bucyrus-Erie Company**

**South Milwaukee  
 Wisconsin, U.S.A.**

**MINING WORLD**

Drive your blast hole  
costs DOWN with



**TIREX**

Economic churn drill operation demands extreme cable dependability. High temperatures caused by summer sun and high current load, accidental run-overs by trucks, and impact against sharp rocks demand a cable with high stamina. Simplex-TIREX Portable Cables were designed and engineered especially to meet the needs peculiar to mining.

TIREX is the only portable cable that has Selenium Neoprene Armor. This armor was developed by Simplex especially for mining cables. It is the toughest, hard-service jacket known. It resists acids, alkalies, chemicals, flame, moisture, oil, and sunlight. It is cured in lead to provide the toughest, longest-lived jacket possible.

Churn drilling is no place for weak-kneed cable that may cause breakdowns, tie-ups, or work stoppage of any kind. For such a vital operation, buy TIREX from your nearest Simplex distributor.

**Simplex** WIRES & CABLES

**TIREX**

CORDS AND CABLES are made only by the

**SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.**

AUGUST 1954

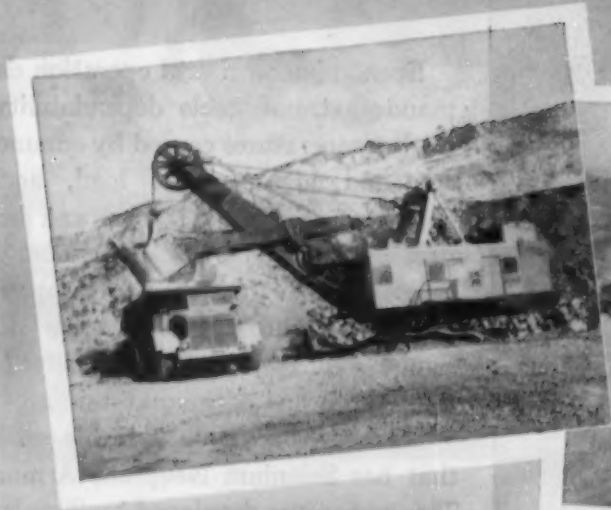
[World Mining Section—5]

5



# MOUNTAIN MOVERS

## uncovering iron ore



### MARION 191-M

*The world's largest shovel on 2 crawlers*



### MARION 151-M

*Teams effectively with 25-ton trucks*

● When stripping problems take on mountainous proportions, these two MARION machines can reduce them to molehills — both as to the time and the costs involved in doing the job.

These MARION machines, shown in action at a western mine, have a steady diet of hard digging and loading. The 191-M with its 10 cubic yard

dipper loads the biggest trucks in a few fast passes. The 151-M teams efficiently with trucks in the 25-ton class.

Get the details about the records of these MARION machines, as to daily output, dependability in heavy-duty digging and operating costs. You'll see why more of the tougher jobs are being done with MARION machines.

## MARION POWER SHOVEL CO.

MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES



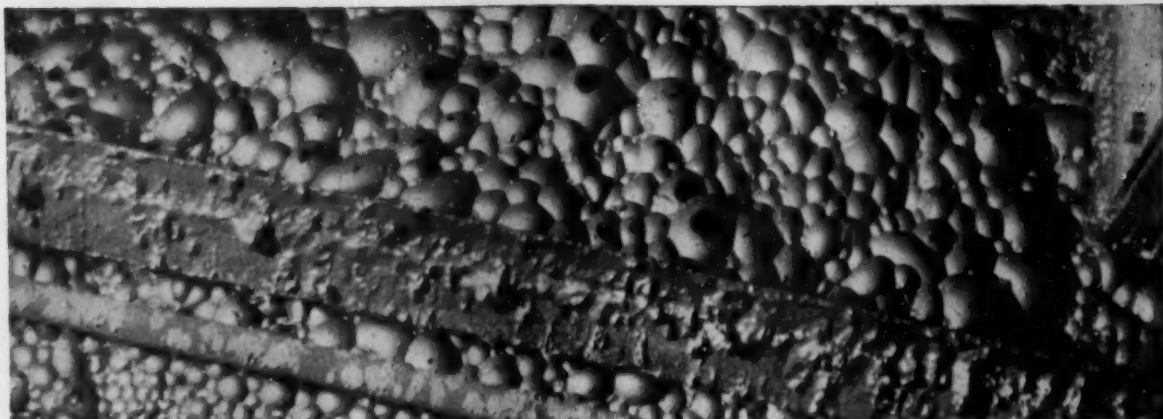
from  $\frac{3}{4}$  to 45 cu. yds.

IN ALL PRINCIPAL CITIES



OSGOOD • GENERAL

A subsidiary manufactures excavating machines from  $\frac{3}{4}$  to 2½ cu. yds., truck cranes from 15 to 25 tons, mobilcranes from 25 to 45 tons, and log loaders.



## Make busy bubbles for better flotation with **DOWFROTH 250**

Dowfroth 250 makes livelier froth on the machine,  
quicker breaking in the launders...  
increases recovery, reduces frother consumption

Full-scale mill operations—not just laboratory tests—are proving the high efficiency and economy of Dowfroth® 250. In many mills today, this powerful synthetic flotation frother is producing improved metallurgy with just one-fourth the consumption of previous frothers used.

The extreme uniformity, insignificant collecting action and complete water solubility of Dowfroth 250 are a helpful combination of properties that make regu-

lation and control easy and exact for your operator.

Pioneer in the production of Xanthates, Dow offers a wide range of these collectors for sulfide mineral flotation. Dow maintains a research laboratory to help you solve your most difficult flotation problems. Write today for your test sample of Dowfroth 250, or more information on Dow's many other quality flotation agents. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 833H.

*you can depend on* **DOW CHEMICALS**





**BEFORE:** Face of metal mine drilled, loaded and connected up, ready for setting off the charge with Du Pont CD-32 Blasting Machine.



**AFTER:** Result of 44-hole shot connected in two series of 22 caps in parallel.



**FIRING**—operator depresses charging switch, waits until pilot light glows, then throws firing switch.

*Midwest metal mine reports:*

# Du Pont CD Blasting Machine Gives Extra Measure of Safety

**Saves money, promotes efficiency, too**

Safety is a prime consideration in mining. This midwest metal mine bought a Du Pont CD-32 Blasting Machine for greater efficiency and economy, of course, but maximum safety was the main reason. They have realized all three advantages.

**Here's why:** Du Pont CD (Condenser Discharge) Blasting Machines

1. Have extremely high capacity for their weight and size.
2. Have no moving parts.
3. Eliminate the human element of generator-type machines.
4. Have a pilot light which indicates to the

operator when to fire the blast.

5. Have many important safety features included in the wiring and switching system.
6. Can be used for firing shots connected in series, parallel, or parallel series.
7. Eliminate need for installation and maintenance of power-firing circuits.

The CD-32's only one of the four dependable Du Pont CD Blasting Machines now serving the industry. All are designed to increase safety, economy and efficiency—and one of them's made to meet *your* needs. To get the facts on all four, contact the Du Pont Explosives representative in your district or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

1954 AMERICAN MINING CONGRESS SHOW  
San Francisco Civic Auditorium—Sept. 20-23  
Be sure to visit us at Booth 801.  
We're looking forward to seeing you.

## DU PONT EXPLOSIVES

*Blasting Supplies and Accessories*



BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY



# 23 DART TRUCKS

*are a "magic carpet" at Bagdad...*



One of Bagdad's 23 DARTs comes up a 20° climb with plenty of horses to spare!



A 25-ton DART dumping overburden. Darts have been in service at Bagdad for over 5 years.



Another 25-ton DART making the climb with a full load of ore.



Mr. Ernest R. Dickie, General Manager of Bagdad Copper Corporation, looks forward to the day when 100-ton DARTs will be added to his fleet.

A 60-ton DART (later modified to carry 75-tons) looms large behind the first kind of mine haulage and a Bagdad beauty. Hailed as the World's Largest Truck, this model is powered with two 350 HP engines; front end suspension is an hydraulic-air strut on which the entire front axle pivots. In service for over a year, the truck is making payload records.





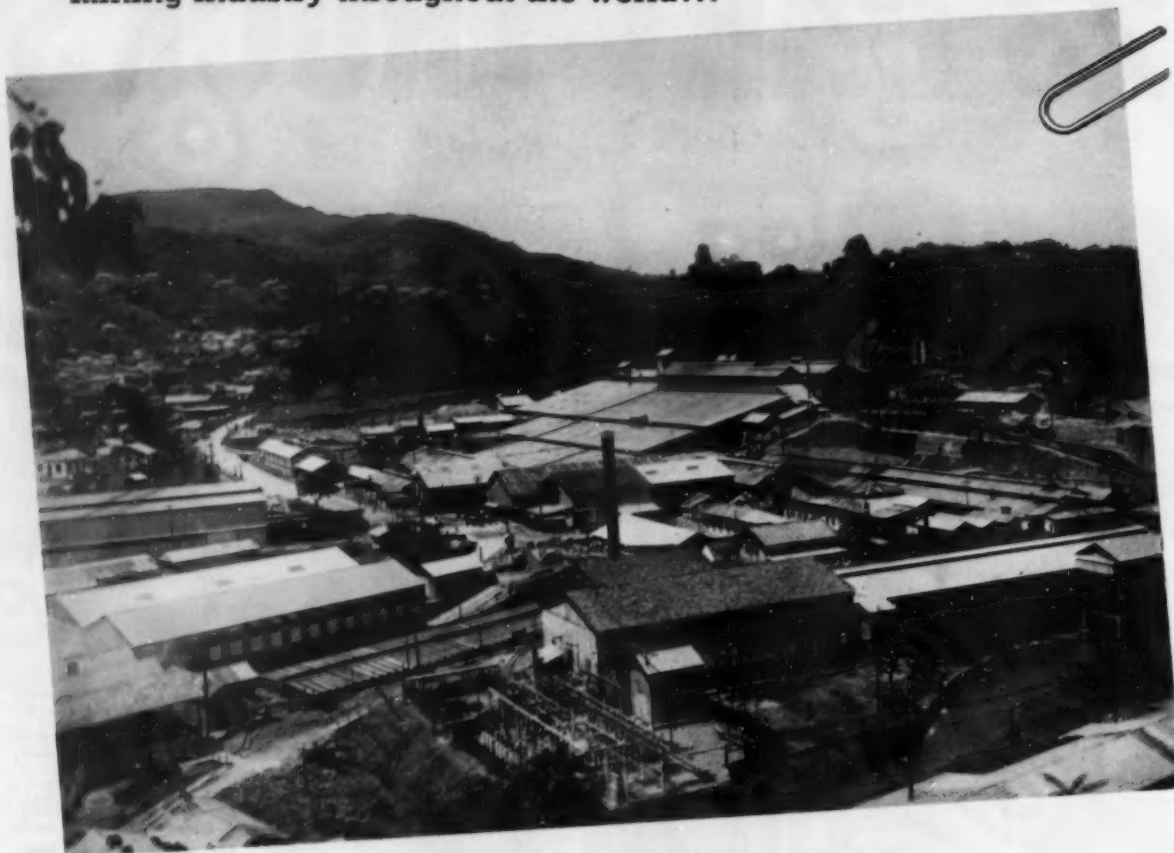

## -DART- TRUCKS



**CALL A DART MAN FOR COMPLETE INFORMATION...**

<p>WASHINGTON, D.C.—G. C. Phillips Tractor Co.</p> <p>WYDEE, ARIZ.—Gear Service &amp; Supply</p> <p>CHARLESTON, W. VA.—W. Va. Tractor &amp; Equipment Co.</p> <p>CINCINNATI, O.—Correll &amp; Edwards Equip. Co.</p> <p>CLEVELAND, O.—Cleveland Constructors Equipment Co.</p> <p>DALLAS, TEX.—H. W. ...</p>	<p>SPRING, TEX.—... Machinery Co.</p> <p>DELOTH, WASH.—Myers Motors</p> <p>HARTFORD, CONN.—H. W. Thompson Co.</p> <p>KANSAS CITY, MO.—Funkehouse Equipment</p> <p>RICHMOND, IOWA.—Osborne Equipment Co.</p> <p>LOS ANGELES, CALIF.—South South Motor Co.</p> <p>MINNEAPOLIS, MINN.—McCarthy, Jones &amp; ...</p>	<p>... Co.</p> <p>OAK LAWN, ILL.—Tractor &amp; Equipment Co.</p> <p>PHILADELPHIA, PA.—Service Supply Corp.</p> <p>PORTLAND, ORE.—Galtzer Machinery Co.</p> <p>PRESBURY, ARIZ.—Prescott Tractor Sales</p> <p>ROCKAWAY, N. J.—Childen Rockwell Co.</p> <p>SALT LAKE CITY, UTAH—Arnold Machinery Co.</p> <p>SEATTLE, WASH.—... Equipment Co.</p>
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How Dorrco Worldwide engineering serves the mining industry throughout the world...



## Gold Mill TONNAGE INCREASED 100% in Brazil

The St. John d'el Rey Mining Company, Brazil's largest gold producer, is a good example of how Dorr Worldwide engineering facilities have been utilized to increase production of existing plants.

Working closely with the client at the existing plant site, Dorr engineers studied all aspects of the problem of treating the complex arsenical ore. On the basis of these exhaustive analyses, recommendations were then made for changes in the existing flowsheet.

The client handled final plant design... and equipment purchased from our Associated Company, Dorr-Oliver Ltd., London, proved most advantageous to him.

This is but one example of how the flexibility of the Dorrco Worldwide engineering organization has worked to the advantage of a client. It can work for you too, through any of the following Associated Companies and Representatives, all with facilities for local manufacture.

**In Europe:** Dorr-Oliver Companies in England, Belgium, The Netherlands, France, Germany and Italy.

**In South Africa:** E. L. Bateman Limited, Johannesburg.

**In India:** Dorr-Oliver (India) Limited, Bombay.

**In Australia:** Hobart Duff Pty. Ltd., Melbourne.

**In Japan:** Sanki Engineering Co., Ltd., Tokyo.

**In South America:** Fiore Company in Buenos Aires; Serva Ribeiro in Rio de Janeiro and Sao Paulo; John Lindsay in Caracas; and conveniently located Dorr Resident Engineers.



*Better tools TODAY to meet tomorrow's demand*

# DORR

WORLD - WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.  
Offices, Associated Companies or Representatives in principal cities of the world.



*Here's the RIGHT Bit  
for You!*

JOY-TRUCO Coring Bit



# JOY-TRUCO and TRUCO DIAMOND BITS



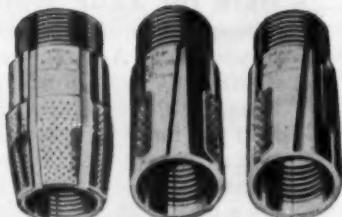
TRUCO Casing Bit



Impregnated Casing Shoe



TRUCO Coring Bit



Tapered and Strip-type Reamer Shells

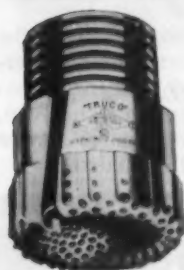
All Joy-Truco and Truco bits are engineered for exceptional performance. They combine these outstanding features:

- 1 Highest quality materials—the best drilling diamonds.
- 2 Patented matrix renowned for its holding qualities and resistance to abrasion.
- 3 Free-cutting design which results from precise placing of diamonds and waterways.

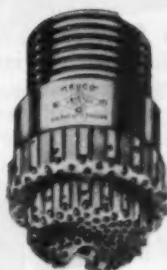
These advantages are the result of constant research and experience, acquired through working in the field with mining engineers and drill operators. And Joy research goes on . . . each used bit returned for our fast, expert resetting service, is thoroughly examined to determine critical points of wear and other performance data. Each reset bit sent back to the same job, or for use on similar formations, contains corrective features which have been shown as necessary by our examination.

Why not find out about "the right bit for every formation?" Our sales and resetting service is worldwide, and a Joy diamond drill specialist is quickly available on request to check your drilling problems and recommend the bit that will do the best job for you.

Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.



Concave and Pilot Blast-hole Bits



*Consult a Joy Engineer*



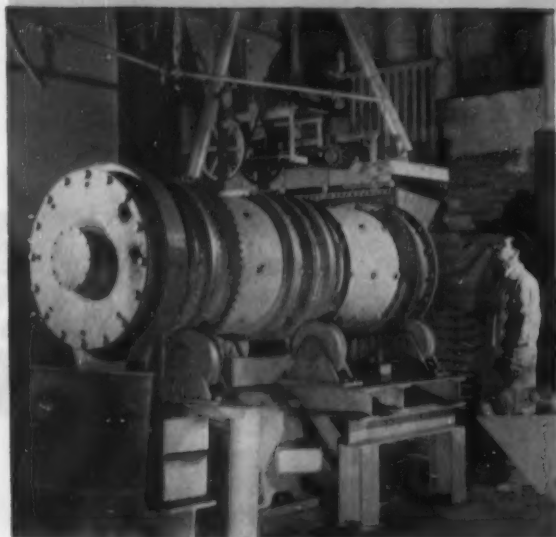
# JOY

W&O M4830

SINCE 1851—OVER A HUNDRED YEARS  
OF ENGINEERING LEADERSHIP



# Here's How Industry's Top



Precision tests in the Allis-Chalmers research laboratory determine grinding characteristics and power requirements—accurately predict full-scale performance.

**I**n lead smelting, Bunker Hill & Sullivan uses a charge for their roasters made up of limestone, reclaimed slag, lead concentrates and circulating by-products. Realizing that a uniform and porous charge would increase roaster capacity and produce an improved sinter, Bunker Hill & Sullivan decided to pelletize the roaster charge. In order to achieve a uniform mixture and control the pellet size, it was necessary that all materials be crushed to minus  $\frac{1}{4}$  inch, with the bulk of the materials minus 10 mesh. The main charge ingredients requiring crushing consisted of limestone, reclaimed slag and return sinter. Allis-Chalmers was asked to help with this problem.

Here's what Allis-Chalmers did:

**Lab Tests** The Allis-Chalmers lab team went to work on samples of these three materials. Impact and compression tests were made to determine crushing resistance. Grinding characteristics were established in rod mill grindability tests. Slag was found to be the ingredient most resistant to crushing. The tests also helped determine type and size of equipment needed and power requirements. All this vital information was obtained easily and at little cost.

**Pilot Plant Run** Because an unusually large dry grinding rod mill had been indicated by the lab tests — and to reveal any factors which may have remained hidden in tests on small samples — twenty tons of slag were run in the Allis-

*helped increase*  
**smelting capacity**  
at the  
**BUNKER HILL & SULLIVAN**  
**MINING AND CONCENTRATING CO.**  
Kellogg, Idaho

Chalmers pilot plant. Evaluation of all test findings by specialized engineers indicated the application of a *Low-Head* screen, *Hydrocone* gyratory crusher and an Allis-Chalmers dry grinding peripheral discharge rod mill for this crushing problem. The equipment is now operating in the Bunker Hill & Sullivan plant where it produces the required finely crushed material for production of pellets.

## Help for Your Staff or Consultants

The same personal, expert attention is available to you. Your A-C representative, backed by industry's top technical team, is always ready to help you make your operation as efficient and profitable as possible — whether it's a matter of planning a complete plant or merely helping you over an occasional rough spot.

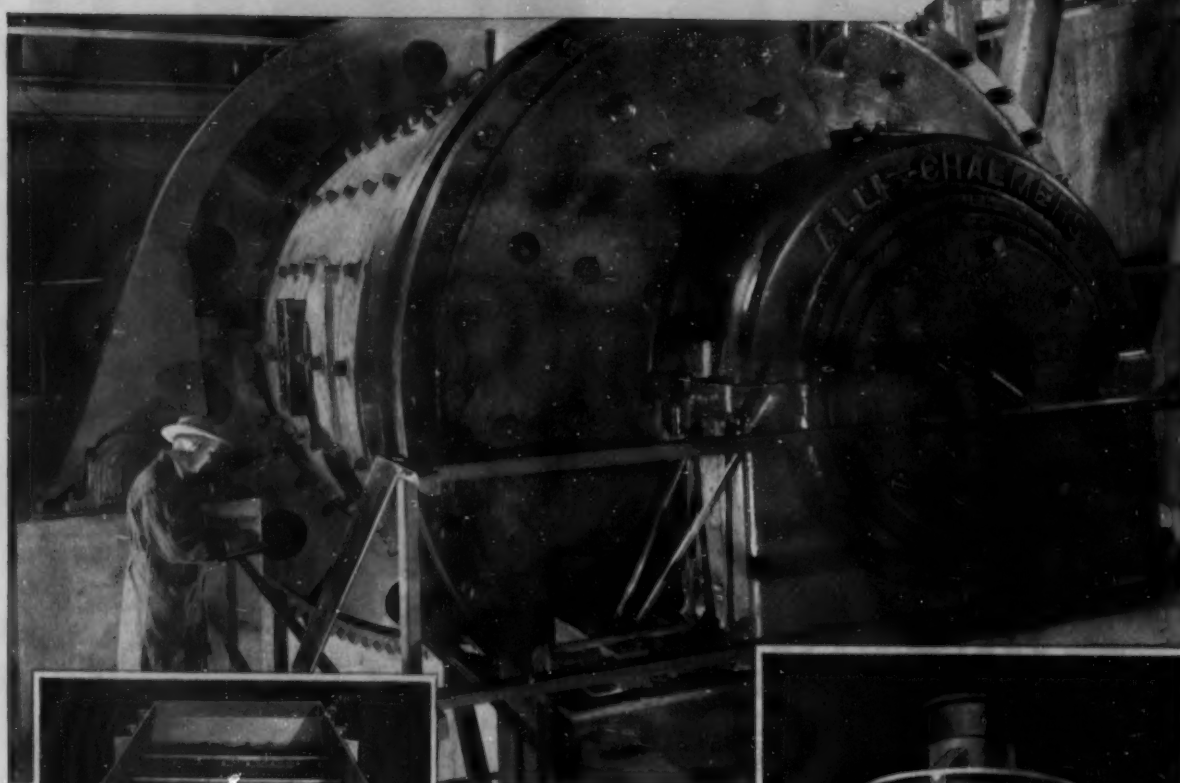


**Continuous Service** Most important is the fact that Allis-Chalmers interest does not terminate with the installation of equipment. Laboratory facilities, periodic equipment checkup, maintenance, and fast emergency parts service are yours continuously from Allis-Chalmers.

# ALLIS-

MINING WORLD

# Technical Team

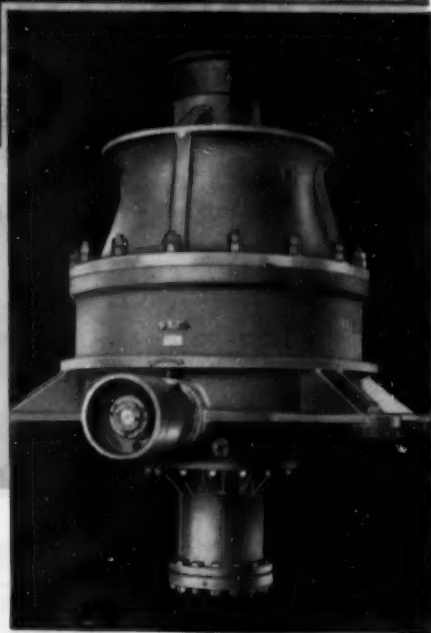


In the Bunker Hill & Sullivan operation, a 48-in. Hydrocone crusher preceded by an Allis-Chalmers red deck screen produces a minus  $\frac{3}{4}$ -in. feed for the 9 x 12 Allis-Chalmers dry grinding peripheral discharge red mill which delivers a minus 10 mesh product for pelletizing.

*Low-Head and Hydrocone are Allis-Chalmers trademarks.*

**ALLIS-CHALMERS**  
Equipment for the  
Mining and Rock  
Products Industries

A-4402



**Crushers — all types**  
**Vibrating Screens — all types — Grinding Mills — all types**  
**Kilns — Coolers — Washers — Dryers — Smelting Equipment**

# CHALMERS



For complete information, call your nearest A-C district office or write Allis-Chalmers, Milwaukee 1, Wis.

AUGUST 1954

[World Mining Section—13]

13



## VERSATILE ALLIS-CHALMERS TRACTOR SHOVELS

**Mines Uranium.** With 1-yd bucket, this HD-5G mechanizes underground uranium mining... excavates ore, transports it and loads it into waiting cars or trucks. Interchangeable rock bucket, and rock fork increase tractor usefulness.

*... are always on the GO in mining work*

### HD-5G



1 cu yd bucket  
40 drawbar hp  
16,200 lb

### HD-9G



2 cu yd bucket  
72 drawbar hp  
29,900 lb

### HD-15G



3 cu yd bucket  
135 net engine hp  
47,580 lb  
Hydraulic torque  
converter drive

### HD-20G



4 cu yd bucket  
175 net engine hp  
63,325 lb  
Hydraulic torque  
converter drive

Multi-purpose Allis-Chalmers Tractor Shovels always keep busy producing because they handle so many jobs so well... excavate and load ore, sand, gravel and other bulk materials... maintain tailings dumps... clean up around shovels, hoppers and conveyors... build and maintain haul roads... dig sludge basins and sluiceways and handle dozens of other mining jobs.

Find out how the 1-yd HD-5G, 2-yd HD-9G, 3-yd HD-15G or 4-yd HD-20G Tractor Shovel can provide year-round time- and money-savings on your operation — doing mining jobs a new, better way by increasing output per man-hour and eliminating the need for a lot of specialized machines. Your Allis-Chalmers dealer has all the facts, or will gladly demonstrate for you.

**ALLIS-CHALMERS**  
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.  
MINING WORLD

[World Mining Section—14]



how

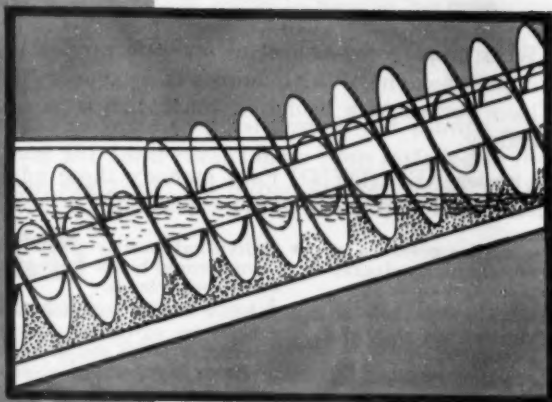
# AKINS

## leadership in mechanical performance can help you cut costs

Classifiers and heavy media separators are selected on the basis of low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance. That's why so many successful mining companies throughout the world continue to order and reorder Akins.

for example ...

### the main shaft



- the rugged Akins main shaft, with greater wall thickness than ordinary classifiers, is designed to permit using a smaller diameter shaft...to obtain maximum metallurgical efficiency. It results in larger active pool and provides for adequate space between the shaft and the flights to obtain the proper drainage of fines necessary for a quiet pool and efficient classification — thus, low-cost-per-ton production.

## WRITE FOR CATALOG

### COLORADO IRON WORKS CO.

1624 17th Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO.

**Licensed Manufacturers and Sales Representatives:**  
Canadian Locomotive Co., Ltd., Kingston, Ont., Canada  
John Carruthers & Co. (Pty.), Ltd., Sydney, Australia  
Head, Wrightson & Co., Ltd., Stockton-on-Tees, England  
Head, Wrightson & Co., S. A. (Pty.), Ltd., Johannesburg

**Sales Agents:**  
Andrews and George Co., Inc., 5 Shiba Park, Tokyo, Japan  
Continental Sales and Equipment Co., Hibbing, Minnesota  
Edw. J. Nell Co., Manila, P. I.  
Wright Bros., Credit Foncier Bldg., Vancouver, B. C., Canada

**"Fresh air really feels good!"**



## **JEFFREY 12A AERODYNE FANS**

**good mine ventilation  
promotes health, safety,  
increases production**

Underground workers' morale shoots sky high when you install Jeffrey AERODYNE Fans. These fans move out bad, stale air and bring in good, fresh air—efficiently and economically.

When employees feel healthy and safe, production goes up, too. Ask one of the hundreds of mine operators who have turned to a leader in ventilation engineering—Jeffrey.

The new 12A Series AERODYNE Fans embody these advanced features engineered and field tested by fan experts:

- 12 blades give higher pressure at lower tip speed, sharply reducing maintenance costs and noise.
- Self-contained fan unit is ready to set on foundation and operate without further adjustment.
- Custom-made pillow block uses standard roller bearings with internal self-circulating oil system.
- Separate ball thrust bearing takes end thrust, relieving radial bearings from thrust load.
- Individual, positive blade adjustment secured by set screws in numbered socket holes.
- Air flow can be reversed for emergencies by reversing direction of rotation or (with engine drives) by reversing blade pitch.
- Oil level for internal self-circulating oil system is controlled by needle float valve regulating gravity flow from outside oil reservoir.
- 12A Series is designed for maximum pressure of 13" W.G. and volume of 20,000 to 700,000 C.F.M.



**THE JEFFREY MANUFACTURING CO.**  
ESTABLISHED 1877  
Columbus 16, Ohio

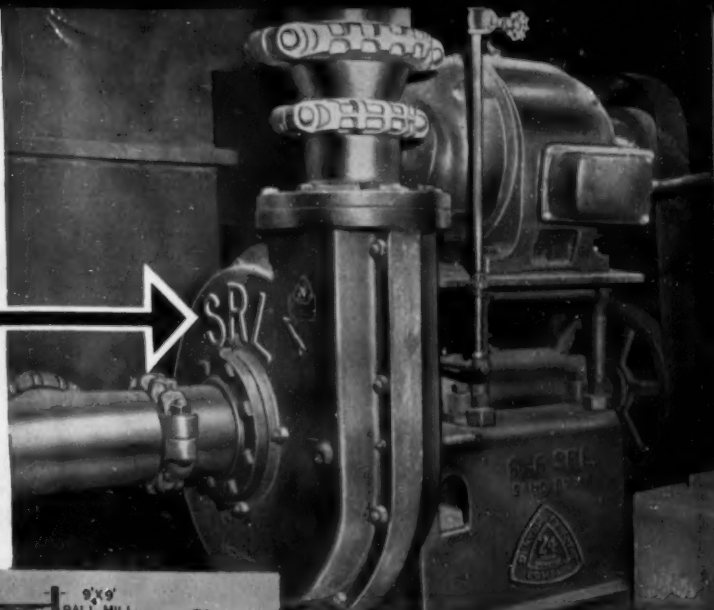
**IF IT'S MINED, PROCESSED OR MOVED  
... IT'S A JOB FOR JEFFREY!**

**sales offices and distributors  
in principal cities**

**PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.**

# DENVER SRL PUMPS AT Climax

Here's why Climax Molybdenum Company has 44 Denver SRL Sand Pumps in it's modern, efficient mill



A 6"x6" Denver SRL Sand Pump operating at 690 r.p.m., handling 2200 tons per 24 hours of -28 mesh classifier overflow material at 45% solids. Life of pump runner and casing liner was 593,000 tons.

## BACKGROUND

Originally, a 2"x2" Denver SRL (Rubber Lined) Sand Pump was installed on a trial basis at Climax to handle coarse, abrasive -28 mesh deslimed pyrite flotation concentrates. Later, Climax purchased one 6"x6" Denver SRL Pump to handle the problem described with the photo above.

## RESULT

Operation of these original Denver SRL pumps was so successful that, as a direct result, 42 additional Denver SRL Sand Pumps have been installed in this outstanding mill. These new pumps vary in size from the 2"x2" SRL (Open Runner) to the 8"x6" SRL-C (Closed Runner).

## REASON

The Climax operators have found the efficient, trouble-free operation of Denver SRL Pumps entirely satisfactory. Life of wearing parts is long and shut-down time minimized. Horsepower requirements have been low and high efficiencies have resulted. Obviously, the Denver SRL is a big success at Climax.

## HOW DENVER SRL PUMPS CAN REDUCE YOUR PUMPING COSTS

Send full data to us today regarding your particular pumping problem. Experienced DECO engineers will evaluate your problem and will return correct and workable recommendations immediately. This will obligate you in no way.

We carry replacement parts for all sizes of Denver SRL Sand Pumps in our Denver stocks. This enables us to give you prompt service whenever you may need it.

## WRITE FOR FREE BULLETIN



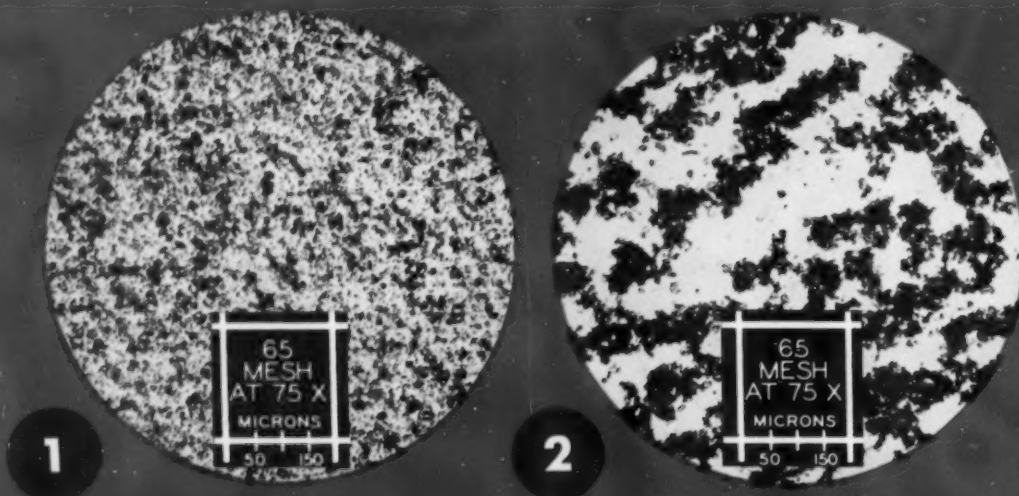
*"The firm that makes its friends happier, healthier and wealthier"*

DENVER, NEW YORK, CHICAGO, EL PASO, SALT LAKE CITY, VANCOUVER, TORONTO, MEXICO, D.F., LONDON, JOHANNESBURG

**DENVER EQUIPMENT CO., 1400 Seventeenth St., Denver 17, Colorado**



**CAMERA-EYE EVIDENCE OF THE  
HIGHLY EFFECTIVE ACTION OF  
CYANAMID AEROFLOC® REAGENTS**



**For powerful flocculation....**

*Photomicrographs show tungsten slimes in dispersed form (Fig. 1), and in flocculated form (Fig. 2) after the addition of only 0.08 lb. AEROFLOC per ton of dry solids. On opposite page, Figure 3 shows 10% solids slurries of these slimes in 1000 ml. graduates, with the addition of AEROFLOC 552 at the rate of 0.08 lb. per ton being made at the right.*

*Figures 4 and 5 (taken one minute and ten minutes later) demonstrate the incredibly fast settling action of the AEROFLOC Reagents.*

Two Cyanamid AEROFLOC Reagents are in commercial use in plants treating precious-metal, base-metal and non-metallic ores and coal. AEROFLOC Reagents speed-up and effect more complete settling of both valuable concentrates and plant tailings, thereby conserving values previously lost to thickener overflow or reducing solids content of plant effluents.

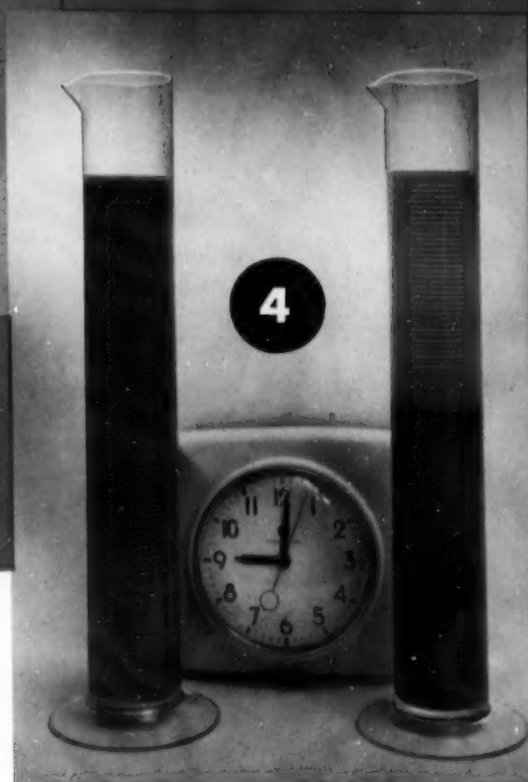
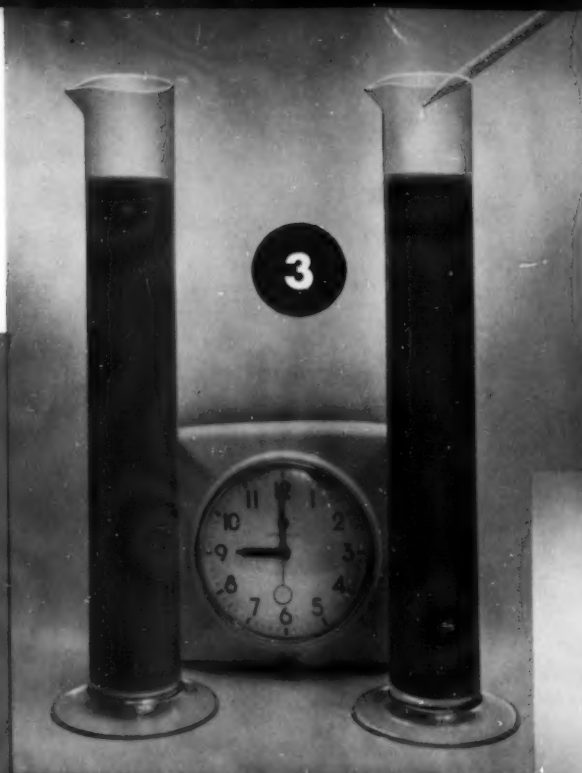
As a filter aid in operating plants, AEROFLOC Reagents increase filtration rates, make filter cakes firmer and more porous, help to prevent

blinding of filter cloth and increase washing ease and efficiency.

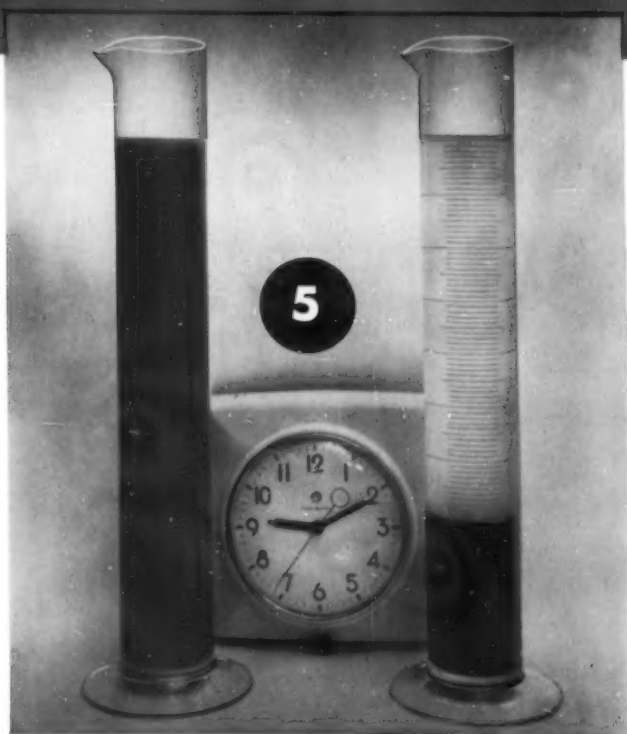
In new and existing plants AEROFLOC Reagents can reduce capital expenditure by increasing the capacity of existing thickening and filtration installations, or reducing size of new units required.

Cyanamid Field Engineers will be happy to work with you in your mill on the application of AEROFLOC Reagents to your particular settling and filtration operations.

*AMERICAN Cyanamid COMPANY*



**to settle slimes quickly**



*Please send data on the two  
AEROFLOC Reagents currently available:*

Name

Title

Company

Address

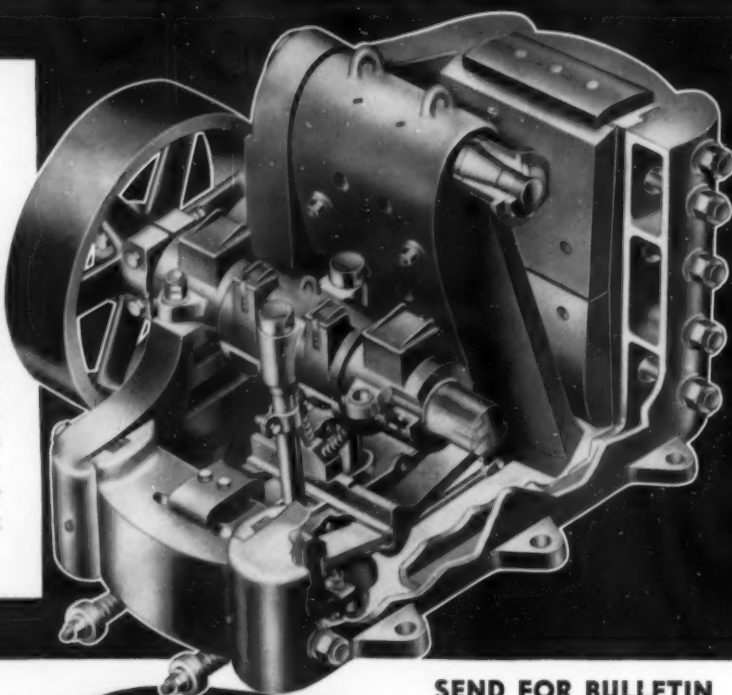


# efficiency

## Comes "NATURAL" With a TRAYLOR "S" JAW CRUSHER



**NATURE** gave the turtle curved jaws. They are amazingly powerful for a creature its size. The curved jaw plates of a Traylor Crusher apply power for crushing in the same way. They, too, are amazingly efficient. Add to this, a cast steel frame, a 3 bearing toggle system and a patented swing jaw suspension for a good measure of dependability. Look into a Traylor type "S" today, it's just naturally more efficient.

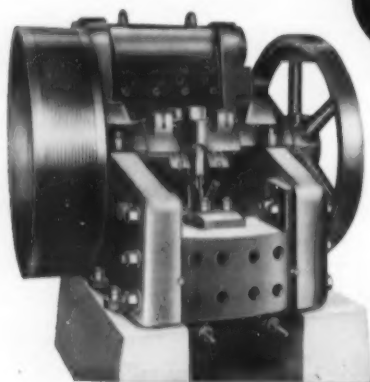


7 sizes with feed openings from 36" x 42" to 60" x 84".

**SEND FOR BULLETIN**  
that gives all the facts

**Traylor**

LEADS TO GREATER PROFITS



**TRAYLOR ENG. & MFG. CO.**  
673 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • San Francisco  
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

**NATURALLY** I'm interested in knowing more about the production efficiency of the Traylor "S" Jaw Crusher.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

I'm now crushing \_\_\_\_\_ tons per hour with a \_\_\_\_\_ crusher.



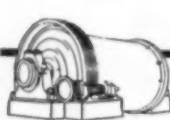
Primary Gyratory Crushers



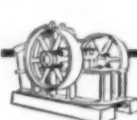
Rotary Kilns



Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders





# ROCK RATED

**before it ever reached the pit!**

Look at the development behind the P&H Model 1055 and you see why this 3½-yd. shovel can outproduce machines of greater rated capacity.

It's the one rock shovel built completely from progressive ideas. P&H was first with the added strength of welded steel construction . . . the pioneer in better weight distribution to let you use full digging power at tooth point . . . the leader in cushioned hydraulic control. And it's P&H with revolutionary Magnetorque\* that swings you through a faster, smoother cycle in any kind of weather. Count on 15% additional rock production from this P&H advancement alone!

There's a companion P&H 955A Shovel in the 2½-yd. class equally as outstanding. Write today for further facts about either model.

with **P&H** **MAGNETORQUE\***  
ELECTRIC SWING

**... FRICTION FREE**  
**... TROUBLE FREE**

**Lasts the life of the machine!**

\*T.M. of Harnischfeger Corporation  
for electro-magnetic type coupling.

**P&H** LARGE EXCAVATOR DIVISION  
**HARNISCHFEGER**  
CORPORATION  
MILWAUKEE 46, WISCONSIN

the **P&H** Line



TRUCK CRANES



DIESEL ENGINES



POWER SHOVELS



PREFABRICATED HOMES



HOISTS



SOIL STABILIZERS



WELDING EQUIPMENT



OVERHEAD CRANES

# Increase your footage

Use CLEVELAND Air Legs and Drills...the easiest way



*There's a*  
**CLEVELAND Air Leg**  
to meet every need

**THE FEED YOU NEED  
— FROM ZERO FEED TO FULL LINE**

Eleven detent positions enable drill operator to set and maintain pressures in a range from zero to full-line feeding pressure — with an increase of 9 psi at each setting. That's why a CLEVELAND Air Leg and H10AL Drill combination gives top performance in any kind of rock.

Shown here is a CLEVELAND AL-92 Telescopic Air Leg with H10AL Drill. Because of space limitations, full length isn't shown.

**CLEVELAND AL-92 Telescopic Air Leg with H10AL Drill**  
and exclusive 11-position feed control

**SPECIFICATIONS**  
Standard, automatic controlled wet-type backhead.

Chuck Sizes.....	$\frac{3}{8}$ " x $4\frac{1}{4}$ " — or other popular steel shank sizes	
Weight, Drill.....	60 lbs.	
Air Hose .....	$\frac{3}{4}$ "	
Water Hose .....	$\frac{1}{2}$ "	
Full Feed Travel.....	4'	6'
Collapsed Feed.....	2' ea. piston	3' ea. piston
Closed Length.....	48"	60"
Extended Length.....	96"	132"
Air Leg Weight.....	37 lbs.	42 lbs.

**CLEVELAND AL-90 Single Extension Air Leg**  
for use with H10AL Drill and exclusive 11-position feed control

**SPECIFICATIONS**

Weight, Drill.....	60 lbs.
Air Hose .....	$\frac{3}{4}$ "
Water Hose .....	$\frac{1}{2}$ "
Feed Travel .....	36" — 48" — 60"
Closed Length .....	56 $\frac{3}{4}$ " — 69" — 81 $\frac{1}{4}$ "
Extended Length .....	92 $\frac{3}{4}$ " — 117" — 141 $\frac{1}{4}$ "
Air Leg Weight .....	30 lbs.—34 lbs.—37 lbs.

**CLEVELAND AL-91 Single-Extension Air Leg** for use with any 35-lb., 45-lb., or 55-lb. class rock drill.  
Feed control built into air leg.

**SPECIFICATIONS**  
Standard wet, or automatic controlled, wet-type backhead available.

Air Hose.....	$\frac{3}{4}$ "
Water Hose.....	$\frac{1}{2}$ "
Feed Travel.....	36" — 48" — 60"
Closed Length.....	58" — 71" — 83"
Extended Length.....	94" — 119" — 143"
Air Leg Weight.....	35 lbs.—38 lbs.—41 lbs.

# per man-shift!

## to drill rock

**Choose  
the drilling combination  
that's best for you  
from the industry's only  
complete line of telescopic  
or single-extension air legs.**

**M**INERS like to use a CLEVELAND Air Leg and H10AL Drill combination. It gives them real flexibility — they can use it as a drifter ... as a stoper ... or as a hand-held drill ... set-ups are quick and easy.

It's an easy-handling combination, also. The air leg supports the drill and absorbs fatiguing recoil. You get flexible feeding pressure, too — from zero to full line. That's why miners drill more footage with CLEVELAND, yet are less tired at the end of their shift.

Exclusive CLEVELAND built-in feed control in the H10AL Drill eliminates a third hose and cumbersome "Y" connections. There's no feed-control bleed valve — the operator doesn't have to bleed off air continuously, to maintain suitable feeding pressure. He can change or advance the position of the leg easily and quickly.

The air leg holds the drill in line with the hole — thus reducing front-end drill wear and practically eliminating rotation strains.

These are ways a CLEVELAND Air Leg and H10AL Drill combination helps you get more drilling for less cost. Take advantage of them.

Write today for Bulletin RD-30 for complete information.



**CLEVELAND AL-93 Telescopic Air Leg** for use with any 35-lb., 45-lb., or 55-lb. class rock drill. Feed control built into air leg.

#### **SPECIFICATIONS**

Full Feed Travel .....	4'	6'
Collapsed Feed .....	2' ea. piston	3' ea. piston
Closed Length .....	50"	62"
Extended Length .....	98"	134"
Air Leg Weight .....	42 lbs.	47 lbs.



## **CLEVELAND ROCK DRILL DIVISION** **Le Roi Company**

A Subsidiary of Westinghouse Air Brake Co.

**12500 BERA ROAD • CLEVELAND 11, OHIO**

RD-30

Plants: Milwaukee, Wisconsin • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

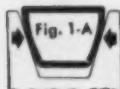


# if you want lower V-Belt costs —



When a V-Belt bends,  
you can feel its sides  
change shape.

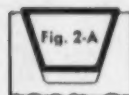
*just make  
this simple test*



Take *any* V-belt that has *straight* sides (Fig. 1). Bend that V-belt while you grip its sides with your fingers. You will *feel* the sides *bulge out* (Fig. 1-A). Clearly, that out-bulge forces the belt to press *unevenly* against the V-pulley—and this *concentrates* wear at the points shown by arrows (Fig. 1-A).

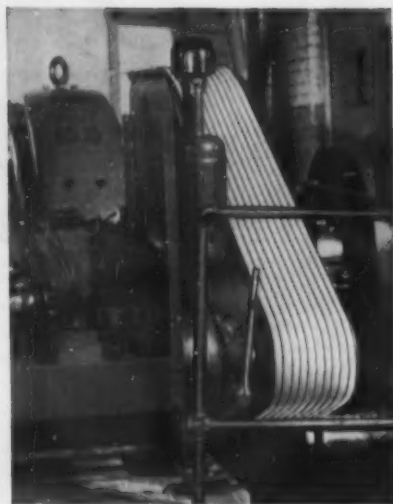
## Now bend a Gates Vulco Rope with **CONCAVE SIDES** (Fig. 2)

(U.S. PAT. NO. 1813698)



Instead of *bulging*, the precisely engineered **CONCAVE SIDES** merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides of the Gates Vulco Rope press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the *full face* of this belt—resulting in *longer belt life* and *lower belt costs* for you!

When you buy V-belts, be sure to get the V-belt with the Concave Sides—the Gates Vulco Rope!



Typical Gates Vulco Rope Drive  
—the Gates V-Belts are built with Concave Sides  
to insure longer belt wear.



**VULCO ROPE  
DRIVES**

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

THE GATES RUBBER COMPANY  
DENVER, U.S.A.

CS-543



**"Tell me...how can we stop overloads from cooking our cable?"**

"We can't always control overloads on our shuttle car cable. But the damage it does has got to be stopped. It raises blisters... which makes our cable easy to tear. And you know... because of that heat the jacket on the bottom layer of cable on the reel hardens and cracks. That raises hob with cable life! What can we do?"



**"You'll put a stop to the trouble if you do this..."**

"One of the most important things is to choose a cable with adequate current rating. Your cable or mining machine manufacturer can help you here. You can help avoid trouble *in the mine*, too. When you remove cable for permanent splicing... reverse the ends. And when you are working only a short distance from the power source, remove your cable from the reel and place it where it will be well ventilated. Finally, remember that you generally get what you pay for — one breakdown in a cheap cable costs you *more* than you save by buying on price."

## **New Anaconda Cables last longer and are safer!**



In 15 mines recently surveyed, ANACONDA Cables on shuttle cars are lasting up to 300% longer than cables used only a few years ago. Why? Anaconda cable jackets are made of a new neoprene formula which assures better protection against hard wear. Improved cold rubber insulation has high heat stamina. An improved stranding flexes better under tension. And a new type breaker strip insures better short-circuit protection. It all adds up to *real economy* in use. See your Anaconda Sales Office or distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

84303

**the right cable for the job**

**ANACONDA®**  
**WIRE AND CABLE**

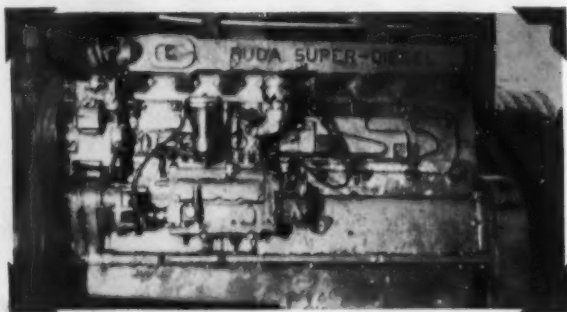
# THE ENGINEER'S REPORT

	DATA
LUBRICANT	RPM DeLo Oils
UNITS	21 Buda diesel engines
OPERATION	Hauling ore
CONDITIONS	Heavy duty — 8-15% grades
PERIOD	6 years
FIRM	Bagdad Copper Corp., Bagdad, Arizona

## No stuck rings in 21 engines in 6 years hauling ore!



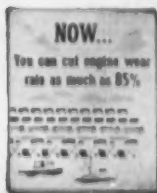
HAULING 22-TON LOADS up 8 to 15% grades out of the Bagdad Copper Corp. open-pit mine, 21 Buda diesels have had no stuck rings, no clogged ring grooves since using RPM DELO Special Lubricating Oil for



the last 6 years. Engines operate 2 shifts a day, 6 days a week in heavy abrasive dust. Torn down after 7000 hours, all parts in the engine above were exceptionally clean and all bearings were good.



BIGGEST OFF-HIGHWAY TRUCK IN THE WORLD (above) was recently built for Bagdad Copper Corp. It weighs 96,000 pounds, hauls 75 tons. RPM DELO Special Lubricating Oil was also selected for its two 350 H.P. supercharged Buda diesels because of the excellent service Bagdad has had from this oil.



There is an RPM DELO Oil to meet every heavy-duty engine operating condition.

FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.



### How RPM DELO Oils keep engines clean and prevent wear



- A. Contain special additives that provide metal-adhesion qualities...keep oil on parts whether they are hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.
- C. Special compounds stop corrosion of any bearing metal, and oil foaming in both wet and dry sump engines.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 30 • STANDARD OIL COMPANY OF TEXAS, El Paso  
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado





## MUSCLES OF STEEL took the load off his back

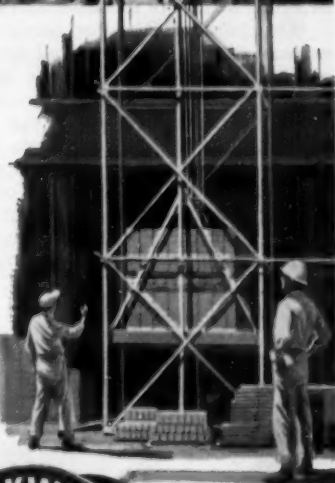
Sweat and a strong back just aren't enough when it comes to meeting the stepped-up demands of modern construction work. Today's contractors and builders call on *muscles of steel*—sturdy wire rope—to lift and carry their heavy loads.

Supplying these *muscles of steel* to the giant that is American industry is our big job here at Wickwire—a job that has commanded our vigilant care

and painstaking quality control for over half a century.

In the mines and the quarries. In the logging camps and the oil fields. On construction and highway projects. With the fishing fleets and in materials handling. Wherever wire rope is used, Wickwire Rope has earned an outstanding reputation for efficiency, utmost safety, long economical service and unfailing reliability.

**every industry benefits from wire rope**



## WICKWIRE ROPE



PRODUCT OF WICKWIRE SPENCER STEEL DIVISION  
THE COLORADO FUEL AND IRON CORPORATION



2487

THE COLORADO FUEL AND IRON CORPORATION—Alamosa, Colo. • Denver • Durango • Golden, Colo. • Leadville • Salt Lake City • Steam  
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane  
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Evansville, Ind. • New Orleans • New York • Philadelphia



Leschen engineers tell you how to determine

## Proper Use of Wire Rope with Wire Rope Core

*First, what is it?* It is a completely metallic rope made with a separate wire rope as a core, instead of the usual fiber core.

*Why is it used?* The steel core resists extreme pressure of individual strands on the core under very heavy loads. Here, a Red-Strand steel core rope substantially outlasts a fiber core rope. The extra steel in the core increases rope strength and safety by 7 1/4%, compared with wire rope with fiber core. For occasional heavier loads this eliminates time and expense of changing sheaves, blocks and equipment to suit a bigger fiber core rope.

Red-Strand steel core rope answers the problem of crushing when rope is spooled in multiple layers on small diameter drums and winches—or when heavy loads are dragged or pulled. It also resists the damaging effects of excessive heat.

*Where is it used?* For extra strength and to resist heavy load pressure: on shovel and draglines—for drag, hoist, crowd and frequently boom ropes; on dredges, trench hoes, cranes and similar heavy duty equipment. To resist crushing: on bulldozers, scrapers, coal cutters, coal loaders, logging, arch and

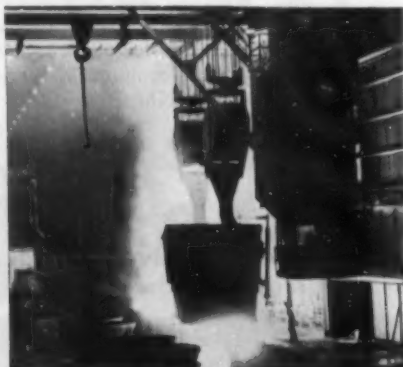
choker lines, and on rotary drilling lines. To resist excessive heat: on hot ladle cranes.

*Which make should you use?* Red-Strand steel core wire rope is highly recommended by its users for its higher-than-rated quality and longer-than-expected service. That saves money.

*What's the next step?* Talk to your Leschen distributor or Leschen field man. They're well qualified to answer your specific questions about Red-Strand steel core wire rope—or to help solve other wire rope problems. That means profit for you.



Severe stress, pressure and crushing occur on wire rope jobs like this and on rotary drilling drums and winches. On these jobs it pays to use higher-than-rated quality Hercules Red-Strand wire rope with wire rope core.



Where tons of molten steel are to be lifted by wire rope, great strength and resistance to intense heat are required. Here Hercules Flat-tensioned Strand wire rope with wire rope core delivers much longer-than-expected service.



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## - Drifts and Crosscuts -

**AEC Needs Help**—Uranium mining is a fast moving business—faster than most mining men realize. It would be faster and more ore would be produced if there were much less government red tape connected with it.

Most certainly government control and regulation are necessary, and the United States Atomic Energy Commission and its employees have done and continue to do a most creditable job under very trying conditions.

Let's face facts. Much as we dislike government control and higher taxes the control in this case is imperative and will be continued. The biggest trouble with this control is that the AEC doesn't have a qualified staff large enough to wade through the red tape and give advice and help to private entrepreneurs who, of necessity, operate under the regulations. This is where taxes should be higher, that is, if AEC can use more money to speed domestic mining of uranium.

It all boils down to the fact that the uranium boom is the best thing that ever happened for the good of the nation (more prospecting means more discoveries), for the mining industry (more plain citizens in more places are learning about mining and that the United States has minerals to mine), and for the AEC (the Raw Materials Division is more-than-ever justifying and meeting its responsibilities to the over-all atomic program).

Here is a case in point of why the AEC needs more men and why the AEC needs to improve its internal administration.

In Southern New Mexico, a mining company has expended thousands of dollars in finding and developing several thousands of tons of average grade  $U_3O_8$  mineralization—not ore—until the AEC will buy it. The company was faced with minimum monthly payments to hold the property and with continuing operational expenses. Since the material was not carnotite or roscoelite it could not be shipped under Provisions of Circular No. 5 Revised (AEC Domestic Uranium Program). Therefore, the mine operators called in a well-known southwest engineering firm to assist in obtaining a market and to advise on geology, development, and any future mining.

A check and test evaluation with the Anaconda Copper Mining Company, AEC ore purchasing agent operating the nearest uranium mill at Bluewater, New Mexico, disclosed the fact that the material was not amenable to Anaconda's limestone ore leaching circuit and was not millable there.

However, AEC's Mining Division at Grand Junction was interested in the deposit, and the first week in April a 10-pound sample was sent to them for metallurgical testing. A sample pulp from the large sample was sent to the Colorado School of Mines Research Foundation for assaying and mineral identification at the same time. Accompanying the sample to AEC was a report on the geology of the deposit, its location, ownership, mine development, how the sample was taken and prepared, a copy of the Colorado Mines Foundation's assays (0.22 percent  $U_3O_8$ ), and an estimate of the tonnage represented. The engineering firm advised the mining company to suspend operations until the AEC could determine marketability of the material.

Exactly two weeks later the AEC acknowledged receipt of the sample and letters and reported the "sample

was found to be radioactive and has been sent for assay."

Some 21 days later (April 28) the AEC reported that the "sample of ore" assayed 0.21 percent  $U_3O_8$  and asked for "information relative to the exact location and approximate extent of your ore deposit."

Several weeks later the AEC had not reported on marketability and was preparing to send a geologist to the property to see where the sample had been taken, despite the fact that the Denver and Albuquerque sub-offices of the AEC Raw Materials Division had both sent geologists to the property and each had its own detailed report.

Admittedly the volume of samples is large, and is growing, but when it takes 21 days to make a uranium assay that is slow. More facilities and additional men must be needed. Reports on the deposit by AEC geologists had been made by at least two field parties yet a third AEC office did not have complete information on the deposit. Perhaps a liaison staff could correlate work and reports of all offices.

And all this may only be the beginning. If the proposed bill (S.-3344) calling for multiple use of public lands does not pass the present session of Congress, the AEC is faced with tremendous administrative problems in dealing with applications for leases under AEC's Circular No. 7. Careful and full investigations and hearings will be necessary. This will be time consuming.

The uranium boom gets faster. AEC needs both men and money to keep up with it. This is one good example where higher taxes are justified.

**Who's New In Uranium**—Perhaps it could be better said "who isn't new in uranium" so great has been the interest in and rush to uranium in the past year. This interest has been many fold: By major mining companies long successful in base metals, iron, or coal. By individuals and prospecting partnerships, and in increasing numbers by newly organized companies who want to get into the uranium business in some form or other. So fast has the uranium field grown that the Directory of Mines published as an integral part of the MINING WORLD Yearbook was incomplete before it was off the press. Because of uranium and the rapid formation of many new companies to prospect for and/or mine uranium a supplemental list of companies is published in this issue starting on page 55. Once again this list will be obsolete before it is printed and announcements of new companies and their activities will be continued to be made in the "Fission Facts" section. It must be realized that all the companies are not now in production, that some have not discovered ore, and that others are in the formative stage. Good luck to every one of them.

**Make September "Gold Month"**—California, the Golden State, and the Golden West will be hosts to the Metal Mining Show scheduled for September 20th in San Francisco. What an appropriate place and time to think about gold, to talk about gold, and to let the citizens know about gold through a carefully planned and well carried out public relations program. Make September the "Gold Month."



# ONE NO. 80 SCRAPER DOES IT ALL!



The Caterpillar No. 80 Scraper in the picture removed nearly all the clay overburden from this 100-foot-deep pit. It was then used to move iron ore to the washing plant of Hodge Mining Company at this operation 7 miles north of Canton, Ga. Cycle time was  $8\frac{1}{2}$  to 9 minutes over a haul distance of 2000 feet, involving extremely stiff grades out of the pit.

Maneuverability in these cramped quarters is a "must." With its ball-and-socket front axle, and sharp turning ability, the No. 80 Scraper is just the rig for this job, according to John W. Hodge, owner.

Even in mucky clay, the No. 80 loads fast, with a live, "boiling" action. The load is cradled low for stability in rough going, and big tires give excellent flotation. Absence of overhead structure permits good operator vision, and presents an easy "target" for shovel loading. The No. 80's capacity is 20 heaped yards (23 with top extensions). It unloads fast and even, thanks to the positive ejection system that controls the rate of spread and sweeps the bowl clean of even sticky materials.

The versatile No. 80 Scraper, teamed with the Caterpillar D8 Tractor, may be the rig to cut costs in *your* mining

operation. Or one of the other CAT\* Scrapers for track-type and rubber-tire tractors with capacities from 4.5 to 25.5 yards. Your Caterpillar Dealer will help you select the scraper that's most profitable for *you*. And he'll stand back of his products with prompt, dependable service and genuine Caterpillar replacement parts. Ask him for a demonstration right on your own job today.

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## CAPITOL CONCENTRATES

### WILL LEAD-ZINC STOCKPILING PLAN RE-OPEN SMALLER MINES?

GSA's latest offers to purchase lead and zinc at the current market prices has borne out early predictions that the new ODM stockpile program would not support our mining industry by purchasing at over-market prices. Only domestic metal "produced" since April 1, 1954 is being accepted in an apparent effort to benefit domestic producers. Although no figures have been made public, the talk around Washington is that purchases probably will not average more than 5,000 tons of zinc per month and there is no guarantee as to the length of the program. This amount would be about one-third or one-fourth of the tonnage necessary to support and maintain adequate prices in the face of potential imports and present consumption figures. The market appeared to have discounted the program in advance, as is indicated by the failure of prices to advance sharply when the government finally went into the market.

The advantages to the domestic producer of GSA's purchasing newly produced domestic metal seem dubious. To quote from an earlier analysis of the program: "If the government is going to support the market to a given price, it would not matter to the domestic producer to whom he sold his metal. As the foreign producer would benefit equally from the increased market price, he would just as soon, for instance, sell lead to the battery manufacturer as to the stockpile."

It is difficult to determine the difference between a pound of metal produced in the United States or Mexico, as either serves the same purpose. Purchasing small amounts of domestic metal from smelters, then, is pretty much a political gesture, even if the mines which produced it must be specified. Had the program been designed to help distressed mining areas, the metal would have been bought by means of firm long-term, floor-price contracts given directly to the mines in those areas. Clearly, the government cannot afford to buy all the foreign metal offered, but by a sort of sleight-of-hand performance it is in effect buying a part of the imports indirectly. The whole affair seems badly muddled and another case of "too little and too late."

#### • A Rose By Another Name

When the State Department's appropriation bill reached the Senate it contained this provision: "None of the funds made available by this appropriation shall be used to pay the salaries and expenses of the Metals and Minerals Staff in the Office of Economic Affairs."

The House committee stated in a report: "The committee is very much concerned with the activities of the Metals and Minerals Staff of the Office of Economic Affairs . . . (and) has reached the conclusion that the Metals and Minerals Staff should be abolished." The report went on to say that the domestic mining industry would be better protected were the State Department to look to the U. S. Bureau of Mines for guidance.

The State Department made the following reply: The

Department of State is not able to fulfill its responsibilities without a few qualified staff members concentrating on the international aspects of metals and minerals. These individuals need not be termed members of the Metals and Minerals Staff, of course and, indeed, the title of their unit is not very important."

The episode is cited as an example to show the steps an agency will take to avoid a Congressional directive.

#### • New Purchase Directive Issued

Evidently the uproar over the rejection of bids to supply lead at the market price for the stockpile scared the pants off the Office of Defense Mobilization (or the White House) and a new directive authorized purchases at the market price current at the time of the bid. This nasty affair brought out the interesting information that the Washington planners thought lead should be priced below 14 cents and zinc under 13 cents per pound. The domestic industry needs to know how these ceilings were selected. However, it does not appear that the purchase directives will cover enough tonnage to make much of a dent in the surpluses piled up by excessive imports.

#### • Additional Funds Requested For Stockpiling

President Eisenhower has requested a supplemental appropriation of \$380,000,000 for use in acquiring strategic and critical materials for the national stockpile. If appropriated, the money will be expended by the General Services Administration.

Two recent developments, said the White House, are responsible for the request for additional funds: (1) certain materials are now expected to be made available in greater quantities; and (2) the President's Cabinet Committee on Mineral Policy has developed plans that are expected to increase the objectives of the stockpile program and thereby further reduce dependence of this country on foreign sources during wartime.

#### • Mining Claims on Withdrawn Lands

Representative Engle's bill to permit location of mining claims on public lands withdrawn for power sites moved one step forward when the Senate Interior and Insular Affairs Committee voted to report favorably—with amendments. The bill, H. R. 3915, passed the House last year.

The amendments adopted by the Senate committee had been recommended by the Interior Department and on such lands would: (1) define the surface rights of mining claim locators prior to issuance of patent; (2) provide for the disposal of "common sand, stone, gravel, and cinders" under the Materials Act of 1947; (3) authorize the Secretary of Interior to hold public hearings to determine whether placer mining operations in particular areas would be detrimental to other uses of the land; and (4) provide that locators of placer claims be required to execute sufficient bond for restoration of the land whenever the Secretary determines such condition is necessary.

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# Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

August, 1954

## INTERNATIONAL PANORAMA

**WASHINGTON, D. C.**—The United States, normally world's largest importer of mercury, has banned all exports in an effort to end the mysterious shortage.

**GAMBANG, PAHANG, MALAYA**—Security measures against guerrillas have been so successful that four tin mines will be in operation by next year. Before World War II 20 gravel pump mines operated here.

**SEOUL, KOREA**—The Republic of Korea will sell all state-owned mines except the Sangdong and Dalsung tungsten mines. A total of 391 metal, nonmetal and coal mines will be sold.

**JEFFERSON, NORTH CAROLINA**—Nippising Mines Company Limited is conducting a surface diamond drilling program at its Ore Knob copper property. Drilling has indicated 900,000 tons of better than 3.0 percent ore with widths to 15 feet.

**GEORGETOWN, BRITISH GUIANA**—Union Carbide and Carbon Corporation's subsidiary, Northwest Guiana Mining Company, has developed between 4,000,000 and 5,000,000 tons of 40 percent manganese ore on its leased concession.

**SAN FRANCISCO, CALIFORNIA**—An all-time monthly record for production of primary aluminum in the United States was set in May with production at 250,175,582 pounds.

**SEVEN ISLANDS, QUEBEC**—The Iron Ore Company of Canada started shipments of ore from its Labrador mines late in July following completion of a 360-mile railroad and other facilities at a cost of \$200,000,000.

**LEOPOLDVILLE, BELGIUM CONGO**—Union Minière du Haut Katanga increased copper production to 130,000 metric tons in the first half of 1954, compared with 214,000 in all of 1953.

**TUNGSTEN, NORTH CAROLINA**—The Tungsten Mining Corporation is planning to erect a chemical plant to refine low-grade concentrate containing about 18,000 units per year.

**BAGUIO, PHILIPPINE ISLANDS**—The Benguet Exploration Mining Company will erect a new 50-ton-per-day cyanide plant at its high-grade gold mine near Camp 6.

**ASHTABULA, OHIO**—The Electro Metallurgical Company will build a 10,000-annual-ton titanium sponge smelter here. Rutile will be reduced to titanium metal in vacuum furnaces.

**FORT SASKATCHEWAN, CANADA**—Production of nickel has been started at Sheritt Gordon Mines Limited's new leaching plant here. Concentrates from the firm's Lynn Lake mine are treated.

**SANTIAGO, CHILE**—The Chilean government has concluded an agreement with the United States government for joint operations of uranium mines in northern Chile by a new government firm—Radioactiva Ores Corporacion.

**WASHINGTON, D. C.**—Mercury has been added to the list of metals to be purchased under the long-term domestic stockpiling program. Initially only lead and zinc were purchased under the program.

**TEXAS CITY, TEXAS**—Control and operation of the government's Texas City, tin smelter has been transferred to the Treasury Department. The now defunct Reconstruction Finance Corporation formerly controlled it.

**WINKELMAN, ARIZONA**—Inspiration Consolidated Copper Company has taken a lease and option on the Christmas copper mine from Riviera Mines Company. Inspiration has four diamond drills checking mineralization in depth.

**BATTLE MOUNTAIN, NEVADA**—The Magnet Cove Barium Corporation is developing a large high-grade barite deposit on the Greystone claims. A grinding plant will be erected.

**MOUNT ISA, AUSTRALIA**—Widespread surface indications of uranium have been found by prospectors in the Mount Isa-Cloncurry area. In one area Geiger counter readings were 10,000 times normal background.

### U.S. Will Buy Mexican And Domestic Mercury

The United States government, through its General Services Administration, will buy 200,000 flasks of domestic and Mexican mercury at \$225 a flask during the next three and one-half years. The present market price is \$280.

Under the program, the government will buy 125,000 flasks of domestic mercury and 75,000 flasks of Mexican mercury. The guaranteed price will hold until December 31, 1957 or until 200,000 flasks have been acquired, whichever is first.

The program is expected to stimulate North American production of mercury because the purchases contemplated are far in excess of current production. In 1953 domestic production was about 16,000 flasks, while Mexican output was around 13,000 flasks.

One provision of the program will permit negotiation of private contracts with specific foreign producers, particularly those located in Canada.

### Lepidolite Mill Planned To Recover Tantalite

The Lepidolite Development Corporation is carrying out a series of milling tests to beneficiate low-grade lepidolite (lithia mica) which is a by-product of its lithium ore mines, Mauve and Winston, near Salisbury, Southern Rhodesia. Trial milling is now being carried under arrangement at the Meadows Tin Mine mill near Salisbury.

The company is producing regularly by quarrying several hundred tons monthly of high-grade massive lepidolite containing as a rule plus 4 percent  $\text{Li}_2\text{O}$ . High-grade lepidolite is handsorted from low-grade ores which contain less than 3.5 percent  $\text{Li}_2\text{O}$ , the minimum content required by present marketing conditions.

The Mauve mine lepidolite deposit consists of a flatly dipping pegmatite dike which trends over a considerable strike. Lepidolite mineralization displays regularity in form of distinct zoning along the central part of the dike. Several footwall parallel pegmatite dikes have recently been discovered at a short distance from the main body. These were also found to contain lepidolite. Quarrying of the main ore body is being carried out here with a  $\frac{3}{4}$ -yard Diesel power shovel.

The Mauve and Winston lepidolite was found also to contain disseminated tantalite in amounts up to several pounds per ton. Some analyses indicate also up to 2 percent of rubidium. It is expected that milling costs will be borne by the value of extraction of tantalite.





**ANACONDA URANIUM MILL**, at Bluewater, New Mexico is the world's first mill to recover uranium from a limestone gangue ore by carbonate leaching. In the foreground are the office, assay laboratory, warehouse, garage, machine and electrical shops. The curved ramp

leads to the primary crushing plant. The secondary crusher is in the building at left of primary crushing; right of center is the sampling tower with the four steel bins topped by conveyor galley; the mill building proper is at top left with the power plant behind it.

## Milling Uranium Ores: How Anaconda Does the Job at its Bluewater Plant

**By George O. Argall, Jr.**

Editor

*Mining World and World Mining*

Anaconda Copper Mining Company's engineering know-how has paid off again. The firm's geologists, mining engineers, and metallurgists have combined their skills to make Anaconda an important name in uranium by making it the nation's newest integrated uranium ore to high-grade concentrate producer.

And Anaconda is not standing still. Already plans are underway for the expansion of its new uranium mill at Bluewater, New Mexico. A contract has been signed with the United States Atomic Energy Commission for these improvements.

But before we talk about additions, let's see how Anaconda's technical skills were combined to design and build the first uranium mill in the world to recover uranium from a limestone gangue by the carbonate leach process.

Uranium was first discovered in the area by at least two and prob-

ably three or four prospectors in 1947 and 1948. The prospectors who made the discoveries kept quiet while endeavoring to obtain mining leases on the land where the discoveries were made. The first publicized discovery of uranium in the area followed the July 1950 location of uranium in the Todilto limestone by Paddy Martinez, a Navajo Indian shepherd, on lands the mineral rights of which belonged to the Santa Fe Pacific Railway Company. Rapid mine development and exploration by the Railway Company soon indicated a milling tonnage of low-grade secondary type mineralization (See *MINING WORLD*, April 1951, pages 37 and 56, for first report on the uranium deposits of the area.)

The milling plant discussed here is the first of two parts describing Anaconda's uranium project in New Mexico. The September issue of *MINING WORLD* will discuss the mining phase.

In March of 1952 Anaconda began to erect its mill to treat ores to be mined by the Atchison Topeka and Santa Fe Railway Company through its subsidiary, Haystack Mountain Development Company; by Anaconda on leases it had acquired; and by other producers. Production started in September 1953 with all concentrate to be sold to the Atomic Energy Commission under a five-year contract.

### **Why Carbonate Leach?**

It was recognized during preliminary mill planning that the then conventional acid leach used on Colorado Plateau ores would recover the uranium but that cost of doing so would be prohibitive because of the large amount of acid required to acidify a mill pulp composed of up to 95 percent  $\text{CaCO}_3$ . Further that secondary uranium minerals found in the district were readily soluble in hot carbonate solution forming a soluble uranyl carbonate complex so metallurgical testing of typical ores was undertaken by the Anaconda staff at Anaconda, Montana

under the supervision of F. F. Frick, chief metallurgical research engineer.

This test work was based on earlier test work and operating results at other Colorado Plateau mills. In particular the work done at the U. S. Bureau of Mines, metallurgical test laboratory's staff at Salt Lake City, Utah under the direction of J. Bruce Clemmer was of great assistance. A carbonate leach for high-lime sandstone type ores was also being operated on a commercial scale at the Atomic Energy Commission's Monticello, Utah uranium mill.

Testing showed that the ores to be treated contained a minimum of clay minerals which might interfere with filtering and that they settled well after fine grinding, but that the solution consumption would be rapidly increased by any gypsum in the ore. Having these and other facts, it was determined that the carbonate leach was the best method of treating the oxidized limestone ores.

#### Advantages of Leach

Carbonate leaching has the advantage of low plant investment in comparison with acid leaching, a high grade concentrate with a minimum of impurities can be recovered, precipitation of final uranium concentrate is relatively simple, over-all recovery is satisfactory, and the cost of plant operation and maintenance is somewhat less than for an acid circuit plant.

#### Bluewater Receiving Station

As agent for the Atomic Energy Commission, Anaconda built a temporary sampling plant starting in June 1952. Subsequently, the main crushing and sampling plant were

completed as the first step in mill construction.

This is the Bluewater Receiving Station and was established in order to provide a ready market for locally produced ores, to encourage additional prospecting and mine development in the area, and to build a backlog of ore for the mill. The mill expansions in capacity now under way are proof of the success of the program.

#### Ore Buying Procedure

As agent for the AEC Anaconda has weighed, sampled, and stock-piled both limestone and sandstone type ores. Limestone ores have all been mined in the Grants area with the majority of the tonnage coming from mines north, northwest, and northeast of the mill. Anaconda, however, has developed some limestone ore about 60 miles southeast of the mill on the Laguna Indian Reservation. Important shippers of limestone ore have been The Haystack Mountain Development Company (Santa Fe Railroad subsidiary); Anaconda Copper Mining Company (Section 9); E. & M. Min-

ing Company; F. O. Manol; Hanosh Mines, Inc.; Glen Williams, and Uranium Development Corporation.

It was not long after the announced discovery of uranium in the Todilto limestone that intensive prospecting resulted in further ore discoveries in the overlying Morrison formation. Actually the first discoveries, though unpublicized were probably made in this formation. This ore with a sandstone gangue is nearly the same as the carnotite type ore found in the Morrison in Colorado and Utah with the exception of having a lower vanadium content. Prospecting continued and major discoveries of sandstone ore (Westwater formation) were made by Anaconda on the Laguna Reservation 55 miles east and by Haystack Development at Poison Canyon eight miles northeast of Bluewater. "Sandstone" ore was also developed near Holbrook and Cameron, Arizona, in the Chinle shales.

Sandstone type ores have been purchased at the Bluewater receiving depot since it opened. Important shippers of sandstone ore have been: Haystack Mountain Development Company (Poison Canyon); Anaconda (Evelyn Lease, Wind-whip, and Jackpile); Shattuck-Denn Mining Company (Blue Peak); Coston and Barton; Howard Wilson; A and B Mining Company; Reynolds, O'Halso and Lucas; Carl Elayer, and the Arrowhead Mining Company (Arizona).

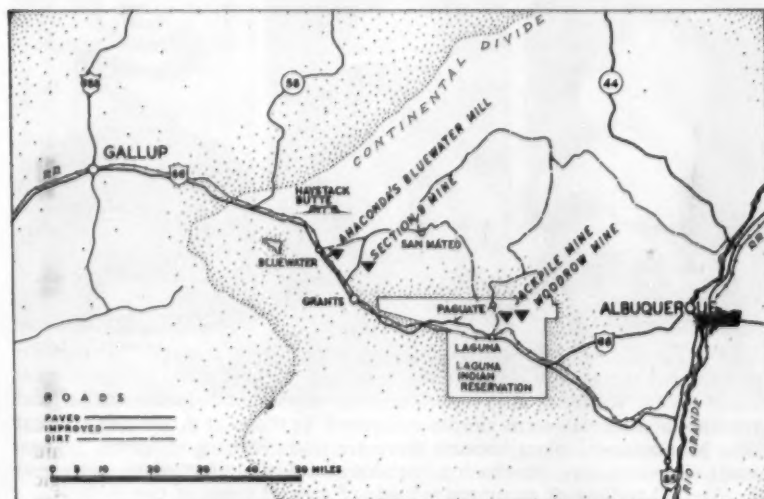
As a part of the current expansion program, Anaconda is building a spur track from the mine line of the Santa Fe Railroad into the mill area with unloading scheduled from a trestle east of the existing sampling plant. This spur will facilitate shipments and lower freight costs on Jackpile and Arizona ores in particular.

#### Receiving a Typical Lot

Ore is delivered by trucks; each loaded truck is weighed; a sample

### How Milling Circuit Is Controlled

- Blend ore for grade and filtering efficiency.
- Batch process blended ore lots.
- Control pulp density of ball mill overflow at 60 percent solids.
- Regulate grinding solution strength and volume by proportioning pregnant solution and leach solution being recirculated.
- Fineness of grind is controlled by cyclonic classification.
- Leaching solution strength is controlled by blending weak pregnant liquor with barren leach liquor, and further by blending grades of ore in order to control, or obtain, the desired leach strength.
- The  $U_2O_5$  concentration in the pregnant liquor is controlled to desired point.





**EMPLOYING LOCAL LABOR** is Anaconda's policy at its Bluewater uranium mill and at its several mines. Many of these employees are Laguna Indians and work in the crushing and sampling crew pictured here. Left to right in **FRONT ROW** are: Procopio Sandoval, Abe Pena, Lorenzo Salazar, Dennis Cheromiah, David Pino, and Amos Leach, crusher foreman. **MIDDLE ROW**: Ricardo Salazar, Ismael Salazar, Pablo Cabrera, Joseph Yawea, Pete Poncho, and Horace Quinn. **BACK ROW** are: Vance Marshall, night shift boss, Larry Leach, Keith Elkins, Severo Leon, Felipe Riley, Cecil Rowley, and Preston McCleskey.

catcher accompanies the truck to the particular lot storage area and takes a moisture sample as the truck is dumped; the truck is then weighed empty. At any time after 10 tons of ore have been received in any lot the shipper has the option of closing the lot. Many lots reach 50 to 150 tons and consist of several truck loads which are all dumped in the same pile. After closing a lot a new one is started and trucks dump to start a new pile.

After a lot is closed it is scheduled through the crushing and sampling plant. The pile is loaded into one of two 12-yard Tournapull-Rockwagons by a Hough Payloader and then hauled up the ramp and dumped through a 14½-inch square opening grizzly into one of two 20-ton bins. Oversize is sledged through. Tournapulls have proved advantageous for hauling to the grizzly and they have the advantage of fast dumping. However, trucks have proven more practical for stockpiling as the Tournapulls won't pull steep slopes or operate on soft piles.

#### Two-Stage Crushing

Primary crushing is by an 18- by 36-inch Denver jaw crusher set at 2 inches. Feed rate to the crusher is controlled by regulating speed of the pan feeders under the grizzly bins through a six speed Reeves variable drive. Crusher undersize is conveyed to the secondary crushing building and fed to a 3- by 6-foot Tyler vibrating screen with undersize chuting to a conveyor belt and oversize

feeding a 3-foot Symons shorthead crusher set at ½ to ¾ inch, according to moisture content of the ore. The crushed ore is then elevated by belt conveyor to the top of the sampling plant.

#### Sampling Plant

In the sampling plant a Utah Ore Sampler type cutter takes 12 percent of the stream as a primary cut. This sample is screened to minus-¼-inch on a 3- by 6-foot Tyler vibrating screen. Oversize drops to rolls set at ¼-inch operating in closed circuit with the Tyler. Roll undersize is returned to the screen by a Jeffrey bucket elevator. Screen

undersize is put through a second Utah Sampler which makes a 16 percent cut. This in turn drops to a third Utah sampler where a second 16 percent cut is taken. A fourth and final sample is taken by a small Snyder Sampler and is caught in a closable can, marked and sent to the laboratory. Rejects from the second, third, and fourth samplers are combined and elevated to the top of the sampling tower to join the main stream of ore (primary sampler reject) on the belt conveyor leading to storage bins. The receiving bins, crushers, and sampling plant are cleaned between each lot to prevent salting of subsequent lots.

#### To Stockpile or Mill

Between the sampler and the mill are four in-line steel tank bins. The bin closest to the sampler is termed a truck bin and is used when sampling all sandstone ores as well as for lots of non-amenable limestone ores. It is always used when a lot is being sampled which is to be stockpiled before milling. The belt conveyor discharge tripper is positioned over the top of the truck bin and the entire lot dropped into the bin. Trucks load from the bottom of the bin and haul the lot to the desired stockpile area. Separation by piles is made on the basis of metallurgical characteristics.

Lots of amenable limestone ore, as needed for grade and tonnage, go through the sampling plant and to one of three mill storage bins. Each lot is placed in a separate bin and withdrawn for mill feed as needed and described below.

#### Control is Key to Process

The mill is operated on a continuously successive series of batch



(LEFT TO RIGHT:) John B. Knaebel, manager of Anaconda's uranium operations, has used his hobby of flying to find ore and speed administration details. W. J. Roberts, mill superintendent, says that "Hydrometallurgical problems at Bluewater are simple compared to those at Anaconda's Great Falls, Montana zinc plant because there are no interfering elements." Amos Leach, foreman, ore purchasing, crushing and sampling plant correlates handling of many truck loads of several types of ore.



runs. Batch operation is made possible by the three 200-ton bottom draw-off fine ore bins. These bins each have a Transportometer feeder which can deliver any desired and necessary tonnage to the No. 4 conveyor belt leading to the mill grinding circuit. Successive 175-ton lots of ore from the sampling plant are stored in the three bins. While one bin is being filled with a new lot, ore from the other two is available for blending. A (wet cut) sample from each lot is rushed to the laboratory where a radiometric assay is made. Results are available for the mill shift foreman within two hours. He then can calculate treatment for the entire lot from one bin or blend from two bins or two lots by desired setting of the two feeders. Ore is blended both for uniformity of grade and for filtering efficiency.

### Grinding Circuit

Crushed ore, minus-1-inch, from the storage bins is fed directly to a 5- by 10-foot Marcy rod mill operating in open circuit and charged with 3-inch steel rods. Mill overflow drops to a 5- by 12-foot Marcy ball mill operating in closed circuit with a on-the-job made cyclone. The mill is charged with a small load (5 tons) of 2-inch balls. All ball mill overflow drops to a collection box set below mill floor level and is pumped to the cyclone. The underflow goes to the leaching circuit and the overflow returns by gravity to the ball mill.

Cyclonic classification has proven very successful. It produces a more easily filtered product which has contributed to a higher uranium recovery, and it has resulted in a more uniform grind. Fineness of grind is 100 percent minus-60-mesh,



LOADED ORE TRUCKS dump on concrete receiving platform until lot is completed. Note the sample catcher and his sealable can ready to take a sample of ore for moisture determination. The ore is from Haystack Mountain Development Company's Section 19 mine.

70 percent minus-200-mesh, and 50 percent minus-325-mesh.

### Solution Control in Grinding

Solution for the wet grinding is added at the ball mill and consists of barren liquor from the leach solution storage plus second wash solution from the Burt filters. The first is barren of uranium and is a mixture of 10 percent  $\text{Na}_2\text{CO}_3$  and 1 percent  $\text{NaHCO}_3$ . Actually it is a regenerated solution from final precipitation and the method of regeneration will be described below. The second wash solution is a weak pregnant solution.

Control of the  $\text{U}_3\text{O}_8$  concentration in the pregnant liquors is maintained by recirculation of weak solutions while grinding low-grade ore. When grinding high-grade ore, a barren leach solution is used.

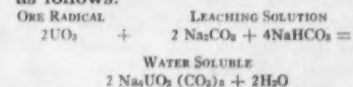
Density control of the pulp is important and is maintained at 60 percent solids in the grinding circuit.

### Batch Pressure Leaching

Cyclone underflow is pumped to one of five 12-foot diameter by 12-foot high leaching tanks. These tanks have dished heads and bottoms and each is equipped with a 30-inch diameter Galigher-type, four-bladed agitation propeller. The tanks are brick-lined in the lower section to combat wear in the vicinity of the propeller. Agitation is caused by the propeller rotating at 190 revolutions per minute. Each tank is equipped with steam coils at top and bottom. Pressure is obtained by heating solution. After a tank has been pumped full of pulp the temperature is brought to 250° F. and pressure to 15 pounds per square inch; this condition is maintained for six hours.

### Chemistry of Leaching

Research is continuing on the chemistry of uranium and there still remains much to be learned about the compounds it forms. However, it is believed that the leaching chemistry is approximately as follows:



Upon completion of leaching time, the pulp is discharged by pressure to one of five Burt filters. Compressed air at 25 pounds pressure is used to effect the transfer.

### Why Use Burt Filters

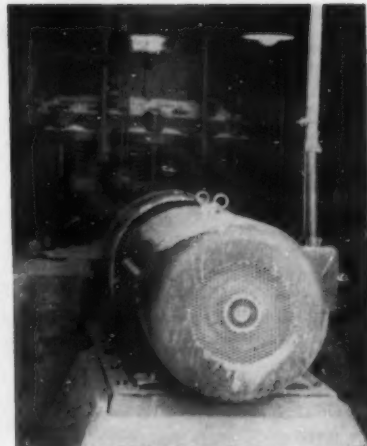
The Burt filter is a batch-type pressure filter with internal filtra-



RECLAIMING STOCKPILED ORE with a Hough Payloader. Ore as needed is weighed and trucked to the receiving bin; goes through the crushing and sampling plant a second time; and is delivered to one of three mill bins for blending into mill feed.



**JAW CRUSHER FEED** (left) is regulated by controlling the speed of the two pan feeders through



Reeves speed reducers. Secondary crushing (right) is done in this Symons 3-foot standard cone crusher.

tion media ideally suited to filtering requirements for the uranium pulp. Primarily, this is because a positive displacement wash is possible; also the temperature of the pulp may be easily maintained during filtering, and an excessive volume of wash water is not necessary.

The Burt filter may be considered as a hollow steel cylinder 40 feet long and 5 feet in diameter capable of being rotated about its long axis. It is suspended by a hollow trunion bearing at the feed end and two external rollers along its length. The periphery of the inside of the cylinder is lined with rows of filter "boards" 16 feet long. Boards are actually a welded hollow metal core with longitudinally grooved wooden face boards covered with a sock-like filter cloth. Anaconda's experience has shown that a board having base angles of 45° between the bottom and two sides is most efficient to give a better break-away of cake during the discharge cycle. Each board has a series of 5/16-inch holes drilled through to the hollow core so that solutions can escape to the core. Solutions then drain out of filter through a discharge port while the residue is left adhering to the surface of the filter cloth inside the cylinder.

The filter must be rotated to operate. Rotation distributes the pulp over the boards and maintains an internal self-sealing action which results in the desired washing by displacement rather than washing by dilution.

At Bluewater a complete filtering cycle would be as follows: (1) charging with pulp; (2) aid air starting filtration (pregnant solution); (3) first wash; (4) second wash; (5) third wash; (6) apply

vacuum; 7) repulping; (8) discharge; and (9) air blowing.

#### **Operational Cycle**

In starting a filter cycle, rotation is stopped and the filter filled with a predetermined charge (desired load). Charging is through a valve at feed end. The valve is closed and the vessel is pressurized. Rotation begins with high initial speed to distribute cake over the filter boards. Rotation is powered by a d-c motor with a rheostat so that speed can easily be varied from 6 to 12 revolutions per minute. After the pulp has been distributed, rotating speed is reduced and air is added at 30 pounds pressure to settle the cake. At this point filtration

starts. Rotation continues throughout the filtration period and is stopped only to discharge pulp at the end of the cycle.

Filtration continues with the internal pressure holding the cake to the boards. When the solution has been filtered off, a break or crack occurs in the cake adhering to the cloth. This permits escape of hot air and steam through the filter into solution discharge ports and to the outside of the filter where it forms a small jet. This indicates the end of the first filtration and/or any succeeding washing cycle to the operator. Air pressure in the filter is then cut to 5 pounds and the first wash is added. This wash replaces the pregnant solution held in the cake. The second and third washes are given in succession using a predetermined volume of solution in each instance.

Following the third wash all pressure is cut and a vacuum is applied to pull the cake from the cloth. Hot water is then added and the rotation speed increased to make a fluid pulp for discharge. After repulping, the rotation is stopped and the filter emptied by opening the ports at the discharge end and allowing the pulp to drain. This is mill tailing which is pumped through a 4-inch line to a natural depression northeast of the mill.

Pregnant filtrate from the first wash is pumped to the strong pregnant storage tank. If weak from low-grade ore, it might be recirculated to the grinding circuit in order to be recycled and increased to desired strength. The second wash solution is pumped to the weak pregnant storage tank and added to the grinding circuit as needed. Third wash solution is

#### **Anaconda Staff**

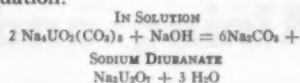
John B. Knaebel, Manager  
Albert J. Fitch, Jr., General Superintendent  
W. J. Roberts, Mill Superintendent  
Dale C. Matthews, Plant Metallurgist  
Robert Lynn, Chief Geologist  
J. P. Herndon, Mine Superintendent  
T. M. Fitch, Master Mechanic  
Jack Pate, Chief Chemist  
Woodrow House, Chief Pilot  
F. G. Holmberg, Chief Clerk  
Amos Leach, Foreman, ore purchasing, crushing and sampling plant  
Wayne Hickson, Power Plant Superintendent  
M. D. Barnaby, Chief Electrician  
B. F. Barlow, Foreman, Jackpile mine  
A. H. Head, Foreman, Section 9 mine  
R. L. Millard, Storekeeper

pumped to first wash solution storage tank. Storage tanks also hold the second and third wash solutions.

### Precipitation

Pregnant solution is pumped through a plate and frame press with the filtrate going to a sock-type filter so as to eliminate all slime and yield a clear effluent for precipitation.

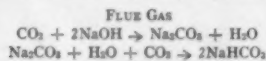
Batch precipitation is followed. Precipitation is relatively simple and is based on the fact that when an excess of sodium hydroxide is added to a carbonate solution containing sodium uranyl tricarbonate, a precipitate of sodium diuranate is formed according to the following equation:



A predetermined (from pregnant solution assay) amount of a 50 percent solution of NaOH is added to the pregnant solution. This neutralizes the bicarbonate to carbonate in the solution. The pregnant solution is agitated in a tank for 10 minutes and then excess hydroxide is added to a desired concentration. The solution temperature is maintained as close to boiling as possible at all times. Precipitation takes place in the tank which is equipped with a ship-type agitator. The resultant pulp is then transferred to a plate and frame press. Filtrate is pumped to the barren solution tank. The precipitate (yellow cake) is washed with water and then with steam to drive off the water and to dry the cake. Finally it is blown with air. Precipitate is then scraped off the press leaves, pan dried on steam coils, and packed in metal containers for shipment to an AEC Feed Materials Preparation Plant. More effective drying procedures are planned.

### Maintain Solution Balance

An important step in the entire process is maintenance of a solution balance by reformation of  $\text{NaHCO}_3$ . Anaconda's metallurgist developed a simple and cheap method of regeneration using exhaust flue gas from the power plant boilers in accordance with the following equation:



The reaction takes place in a carbonation tower, 5 by 5 feet in cross section and 40 feet high, which is built of Cypress. Barren solution (from precipitation) cascades through cross hatched trays against a countercurrent flow of gas. The

regenerated solution is collected at bottom of tower and pumped to the leach solution storage tank.

### Expansion Two-fold

So much for the Bluewater mill of today. How about the modifications and expansions that are now underway with completion of the new facilities set within the next 18 months? This program is two-fold: first by modification of the existing facilities and practices in the carbonate leach uranium mill as originally designed to treat low-grade uranium ores with a limestone gangue, and secondly, by the design and erection of an entire new mill for the recovery of uranium from ores with a sandstone gangue.

The new sandstone mill will be unique for Colorado Plateau milling plants in that no provision will be made to recover vanadium. Vitro Chemical Company's Salt Lake City, Utah uranium mill does not recover vanadium, but its flowsheet is particularly adapted for treatment of primary ores and other types of ores not found in sedimentary formations. The sandstone ores developed to date, in both New Mexico and Arizona and tributary to the Bluewater plant, have such a low vanadium content that its recovery, while feasible, is uneconomical.

The modifications in the carbonate leach mill will provide for treatment of limestone ores containing primary uranium minerals (largely pitchblende) which have been developed in increasing tonnages in the district as unknown and deeply buried deposits have been found and as mining of the original rim- and near-surface deposits has been extended under greater depths of overburden. The new procedures

will provide for the oxidation of primary minerals using oxygen (in the form of air) or a chemical oxidation agent so that they will be soluble in the carbonate leach.

### Power Plant and Shops

Inasmuch as process steam is a necessity at the mill and flue gas could be used it was decided that a steam electric plant was the most efficient source of power. Therefore a coal-burning steam power plant was built. This has a Combustion Engineering, traveling hearth, coal-fired boiler. Two single extraction turbines drive 875-kva electric generators to furnish all power and lighting needs for the mill and townsite. At first Anaconda mined its own coal which was developed in the Mesa Verde formation on Mt. Taylor 30 miles east of the mill. In early 1954 a major natural gas line from New Mexico fields was laid within 6,000 feet of the mill and it was decided to build a feeder line to the mill and to convert the boiler to burn gas.

A warehouse, garage, machine and welding shop, electrical shop, carpenter shop, office and laboratory were the first buildings erected. All are being enlarged to form operational bases to speed erection of the new milling units.

### Community Facilities

Anaconda has built 28 two- and three-bedroom houses for key employees. They are built of pumice block with a southwestern style of architecture.

A new company hospital complete with surgical facilities was opened early in May. Medical services for employees and their families are available at nominal cost.



BURT FILTER ELEMENTS are built and refaced at the carpenter shop. Note the special wide angle at the base of the element in contrast to the higher angled, steep sided elements normally used in zinc plants.





STRIPPING AND HAULAGE problems have been complicated at Bagdad's operation due to deep ravine in which mine is located.

## This is What Streamlined Mining and

Last year the Bagdad Copper Corporation announced plans for more than doubling production from its present 4,000-ton mill and open-pit mine. In the past 15 years this property at Bagdad, Arizona, has blossomed from a shaky 200-ton plant to its present modern operation. Factors which have combined to make this expansion possible are: a complete overhaul and revamping of the mining system, improvements made in mining and haulage equipment by manufacturers, and a careful system of cost accounting maintained at the time.

The company, pointing for a 9,000-ton daily capacity, will attain that goal by financing from present operating profits. Tentatively scheduled in the building program, which will span the next decade, is a FluoSolids unit for roasting copper concentrates, leaching of calcines, an electro-winning plant, and plans for leaching with acidified water, copper oxides currently being stripped with waste, and stockpiled separately.

### Porphyry Copper Deposit

The property has a long and colorful history dating back to 1886 when claims were first staked on the deposit. Many mining methods have been devised to try to work the quartz monzonite-copper ore body at Bagdad, Arizona.

The deposit, dipping at 10 to 15° to the northeast, averages about 370 feet in thickness and is capped by barren Gila Conglomerate up to 200 feet thick. Below the conglomerate is a zone of secondarily enriched ore varying in thickness from 150 to 250 feet. The upper portion of this zone is badly oxidized, and copper values are low. This section is not rich

enough to mine by conventional methods, yet once the ore body is opened up and overburden stripped, the oxide can be profitably handled. Below the secondary zone is the primary mineralization containing copper sulphides and about 0.5 pound of molybdenum per ton.

### Men Versus Nature

First leaching in place was tried, but the lime in the ore and scarcity of water defeated attempts by this method. Next, block carving, carried on during the depression in the 1930's, produced a sound operation on a 200-ton per day scale. During World War II with its accelerated demand for copper, mining and milling facilities were expanded to handle 2,500 tons per day. The caving project on the former small scale was dependent on:

1. Mining small blocks 100 feet in height.

2. Pulling blocks only to the oxide capping, thereby obtaining a maximum mill recovery (oxides weren't recovered by milling).

The pressure to increase production during the war strained the economics of the situation. Labor was scarce, so development lagged. To keep feed going through the mill, existing stopes were drawn rapidly with the result that the badly oxidized material was diluting the ore.

In 1944 a change in company organization took place, and the present management took over. Mining underwent an evolution from block-caving to glory-holing and finally to its present open pit and truck haulage status.

The factors which made Bagdad unique are its relative isolation and the fact that the ore body, lying in a deep ravine, has complicated haulage and stripping problems. Thus from a maintenance standpoint

WHAT'S THE LIMIT on truck size. Perhaps Dart's 12-wheeled, 60 ton giant will point the way to an answer. Two 350 horsepower, Buda Diesel engines mounted amidships of the frame power the truck.



BAGDAD'S 4,000 TON MILL will eventually be expanded to handle 9,000 tons daily. For the future—an electro-winning plant.



## Improved Haulage Did for Bagdad

the operation must be self dependent, and general pit planning and layout must be closely controlled to avoid excessive stripping ratios and road grades.

### Truck Proving Ground

The mine has become known throughout the industry as a proving ground for rubber-tired haulage units. Adverse grades, up to 16 percent, are encountered in the pit, and the rugged conditions under which equipment must operate soon point out faulty design or improvements needed. Manufacturers realize this and work quite closely with the company to test new or untried techniques and parts of trucks. A careful cost-analysis for each make of haulage unit is made by the company in an effort to determine what units give the best performance and what conditions lead to rising costs. Competition at Bagdad between

various makes of trucks has led to new trends in design, and opened new avenues of approach for improving equipment.

### Costs Cut by Torque Converter

The cost records kept by the company has thoroughly sold Bagdad on the use of torque converters. Diesel engines in trucks operate more efficiently under constant speed conditions. Maintenance and repair cost have been sharply reduced by eliminating shock loads attendant with standard transmissions. Another factor pointed out by the cost records is that in general larger haulage units have meant lower costs at this operation. Steep grades have pointed out the advantage of obtaining larger pay loads per trip. The use of Twin Disc three-stage torque converters on some of the newer Dart trucks has shown a saving in both tire wear and brake lining life. The third stage

of the torque converter, actuated by an overriding clutch, exhibits a braking action on the engine on downhill grades, and has reduced brake and tire wear by 25 percent.

### Trend Is To Larger Trucks

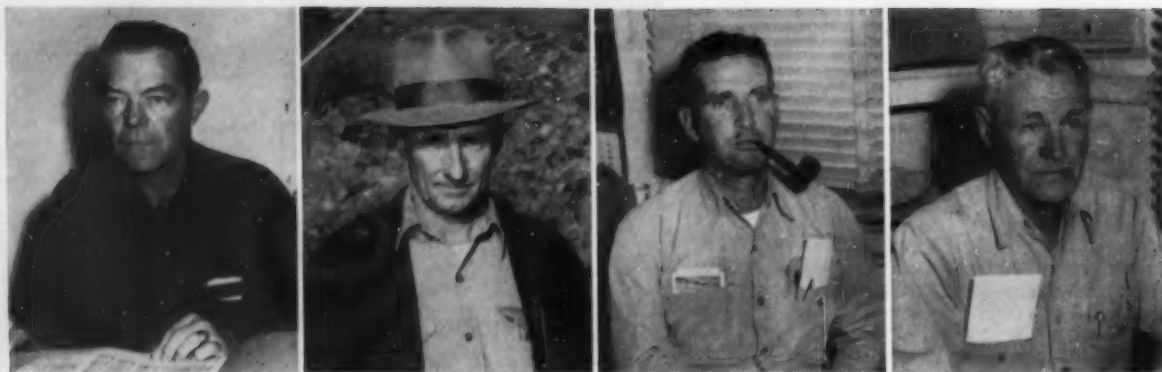
Some of the world's largest haulage units are running an endurance test at the mine. The judge is the cost accountant who keeps a complete record of the performance of each unit. A Dart 60-ton 12 wheeled, twin Diesel-engined truck has just been added to the fleet. Its competition comes from Euclid's 50-ton giant also in use at the property. According to E. R. Dickie, general manager, once the bugs are worked out of the experimental Dart, it is expected that the company's haulage system will be greatly improved. Main difficulty in Dart's gigantic truck was that the twin 350-horsepower engines mounted amidships on the truck frame behind the cab were too far away to efficiently drive the fans behind the radiator located ahead of the cab. Location of the radiators at that point tended to heat the cab. Some trouble also has been experienced with the dumping hoist. Relocation of the fans, radiators and adjustment of the hoist seem to have solved these difficulties.

### Stripping Rate Increased

The expansion program undertaken by Bagdad will span an approximate 10-year period. This is no wild scheme, but rather a gradual stepping up of production rates when sufficient ore is exposed to warrant an expansion of the present 4,000-ton mill facilities. Stripping of waste in 1952 amounted to 3,960,399 tons while 1953 saw an increase to 4,891,426 tons. The waste ore ratio

FIFTY TONS OF WASTE are unloaded at Bagdad's upper dump. This Euclid is another of the key haulage units at the open pit mine. Grades are steep and bigger payloads mean less lost time through breakdowns.





READING FROM left to right, the staff at Bagdad is E. R. Dickie, general manager, Gaylen Guest, mill

superintendent, George Colville, assistant general manager, and Olaf Hondrum, mine superintendent.

during 1953 amounted to 3.97 to 1. Production will not be materially increased either this year or next. However, in 1956 when the bottom bench is opened, Bagdad will be in a position to start expanding. A portion of the operation profits will be plowed back, and the enlargement of facilities will come entirely from company funds.

Future plans include a leaching program to recover copper values from the badly-oxidized upper portion of the ore body. This material is currently being stockpiled on the lower side of the tailing dam and eventually will be used as back fill in worked out portions of the mine.

#### Advance Planning

Water supply, always a critical problem in Arizona, is being attacked scientifically. The company has retained Dr. Heinrich J. Thiele, ground water consultant of Tempe, Arizona, to study the area and locate possible underground sources. Using ground resistance geophysical

methods, Dr. Thiele will attempt to establish the location, the yield, and the thickness of cover to hidden aquifers. This, then is another step using current engineering methods to overcome anticipated problems in advance. A second step being take to provide a water source is the erection of a dam across Burro Creek, some eight miles southwest of the mine site. The plan is to build an earthfill dam to impound flood waters from the stream. The goal is a reservoir of 25,000 acre-feet of water. At present, Bagdad is doing diamond drilling to test foundations and determine geologic structure suitable for a dam site.

#### Mining System

The mining system employed utilizes 50-foot benches drilled with Bucyrus Erie 27-T's on which a 7-inch bit is used. Holes in ore are spaced on 12- to 15-foot centers, while holes in waste are at 20-foot intervals. Drill holes are bottomed 5 feet below grade. Powder used is Hercomite, 30 percent cartridges,

5½ by 25 inches. Primacord extending the full length of each is connected to trunk lines. Electric caps attached to each end of the trunk lines fire all holes simultaneously. Holes are sometimes decked, depending on ground conditions. Two or three staggered rows of holes, the first row 10 to 12 feet from the edge of the bench, are blasted at once.

#### Studies of Rock Breaking

Bagdad has done a considerable amount of test work on its drilling problems. Originally, holes were 10 inches in diameter and spaced on 25-foot centers. Large slabs and blocks produced by this method caused a considerable amount of secondary breaking, and led to experimental work on drill patterns and blasting practice. The end result was that good fragmentation, more footage per drill shift and per bit change was obtained with churn drills putting down 7-inch holes. In sulphide ore, footage averages about 50 feet per drill shift, while in the softer capping footage approaches 80 feet per drill shift. Drill tool weight of 1,200 pounds plus a 250-pound bit gives a total weight of 1,450 pounds on the drill string. The sound approach to the problem has enabled Bagdad to reduce its powder consumption to 0.15 pound per ton of ore broken in average ground and 0.20 pound per ton in very hard ground.

#### Loading and Hauling

Currently six shovels are in use at Bagdad. Four shovels handle waste, while two shovels on the bottom bench are working on ore. The haulage fleet is composed of Dart 30-ton trucks equipped with Twin Disc three stage torque converters, Euclid 22-ton trucks with torque converters, the Dart 60-ton model and a Euclid 50-ton truck. (For specifications on Dart's 60-ton truck see



P & H 1055 working near the edge of the pit perimeter loads one of the smaller 22 ton trucks working at the property. Use of torque converters has resulted in overall reduction of costs.



# Shift Tonnage Handled by Loading Units at Bagdad, Arizona

Machine Description	Tons Per Shovel Shift
P&H 1600—6 yard, electric	4,000
P&H 1400—4½ yard, electric	3,500
P&H 1055—3½ yard, electric	3,000
P&H 1055—3 yard, Diesel	2,000
Northwest 2½ yard, Diesel	1,500

the April 1953 MINING WORLD issue page 73.) These units are generally used on waste. Two 40-ton and one 50-ton Tournarockers (which don't fit in too well with trucks on the haulage cycle) are used to haul the ore to the pit crushing plant.

A 6-yard P & H 1600 and a 4½-yard 1400 shovel are the main loading units used in waste, while smaller P & H 1055's are generally used near the edges of the pit perimeter where frequent moves are necessary. Low grade oxide is currently trucked to the lower side of the tailings dam where it will be leached at a future date. Waste is hauled to a dump above the north limits of the open pit.

Ore broken on the lower benches is hauled to a receiving hopper located at the edge of the pit. The ore passes over a vibrating scalping screen to a 40- by 42-inch Allis Chalmers jaw crusher where it is reduced to 6 inches in size. From here it is discharged to a 6,000-ton glory-hole storage bin. A 980-foot conveyor set on a 17½° slope feeds the grizzlies over the gyratory crusher at the mill. This belt has eliminated a long steep costly haul in order to get ore to the mill.

## Mill Recovers Cu-Mo

The 4,000-ton concentrator at Bagdad will lend itself very readily to expansion. No changes in the circuit are contemplated, but the increased capacity will be provided by adding grinding units and flotation equipment necessary to handle larger tonnages.



DART 60 TON truck has unusual front end suspension. Mounted on a hydraulic strut similar to arrangement used on aircraft landing gear, the front end is suspended on a cushion of captive air.

A more or less conventional crushing plant at the mill reduces feed to the grinding circuit to minus-¾-inch. Four 8 by 9 Marcy ball mills are in closed circuit with three Dorr rake and one Wemco spiral classifier. The 78 percent minus-65-mesh overflow at 32 to 34 percent solids goes through a bulk flotation step to produce a bulk copper-molybdenum concentrate. The frother used is a 50-50 mixture (by volume) of pine oil and methyl alcohol. The alcohol has aided in producing a lighter, slightly more brittle, froth with a resultant decrease in the amount of insoluble material in the concentrate. Collector used on the bulk flotation stage is Z-4 and Z-6.

The copper-molybdenum pulp is cleaned once, thickened and the underflow diluted to 20 percent solids. Next comes a conditioning step with P.S.<sub>5</sub> which acts as a copper depressant, and Diesel oil which serves as a molybdenum collector.

A 3- by 3-foot ball mill regrinds the conditioned bulk concentrate prior to separation of the copper and molybdenum minerals. Tailing from the moly section, forming the copper concentrate is dewatered by thickening and Elmco disc filters. The rougher concentrate is cleaned in six steps in Denver No. 12 flotation machines. Approximately 80 tons of plus-34 percent copper concentrate, and 1,000 pounds of 93 percent molybdenite concentrate are produced per day.

## High Recovery

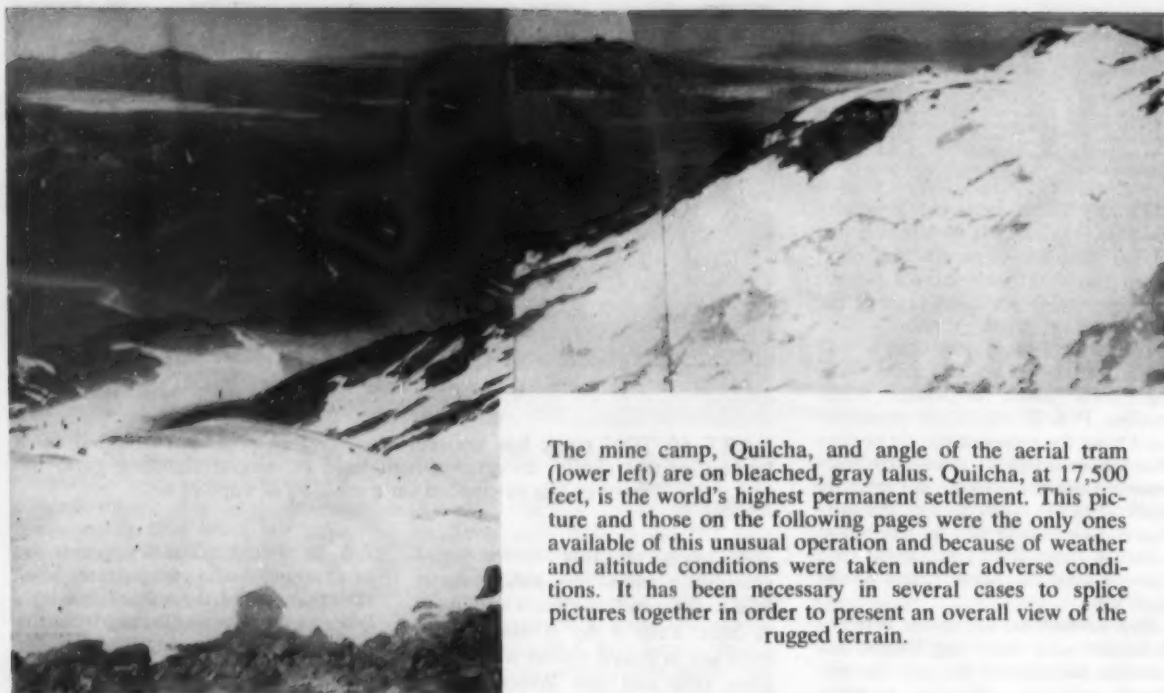
The bulk concentrate contains about 1.58 percent Mo, and it has been found that diluting to 20 percent solids gives a better grade product. Recovery of sulphide copper in the milling circuit is 94.7 percent, one of the highest in the industry. Oxide copper in the feed amounts to about 14.5 percent of the total copper content of the ore. Thus, overall recovery is 84.3 percent.



ORE FROM PIT BOTTOM is hauled to the pit crushing plant by the 40 ton capacity Tournarocker shown



at left. At right a P & H 1600 loads a Dart truck with waste. Roads are kept in excellent condition.



The mine camp, Quilcha, and angle of the aerial tram (lower left) are on bleached, gray talus. Quilcha, at 17,500 feet, is the world's highest permanent settlement. This picture and those on the following pages were the only ones available of this unusual operation and because of weather and altitude conditions were taken under adverse conditions. It has been necessary in several cases to splice pictures together in order to present an overall view of the rugged terrain.

## How High Can Mining Go?

**Mining in Southern Andes reaches 20,000 feet with over 50 mines at elevations higher than 16,000 feet**

**By H. R. Cooke, Jr.**  
Consulting Geologist  
Reno, Nevada

Along the Andean cordillera, on the west coast of South America, is a string of sulphur mines perched near summits of recently or still active volcanoes. These mines constitute the altitude frontier of man's far-flung industry. The highest and largest of these is Aucanquilcha, which offers easiest access to heights of more than 20,000 feet. (Other high-altitude mines in the area, all with substantial production, are listed in Table No. 1.)

Operations at Aucanquilcha are carried on by the Sociedad Azufrera Aucanquilcha S.A. which was begun in 1913 by the Carrasco family, and has remained in their control. Active management is in the hands of Raul Carrasco, a member of the AIME and IMM.

### General Features

Aucanquilcha is possibly the richest accessible body of sulphur in the

world. The mine workings, in Chile, reach about 20,200 feet in altitude, near the summit of Cerro Aucanquilcha, 20,280 feet. These workings are five miles south of the Bolivian border and about 16 miles west of Ollagüe, Chile. Ollagüe is on the Antofagasta-La Paz railway, 274 miles from the port of Antofagasta. The ore is brought by aerial tram from the mine to the company spur railroad, 8 miles from the main line, then to the company's plant in Ollagüe to be treated for shipment to consumers, mainly in Chile.

Ollagüe is a town of 1,000 people, serving chiefly as the railroad station for Aucanquilcha and some sulphur and copper mining on the Ollagüe-Collaguasi branch railroad. It is built on a dry lake, the Salar de Ollagüe, at 12,100 feet elevation and is surrounded by a dozen volcanic peaks over 17,000 feet in altitude.

### High Altitude Climate

Ollagüe has cold nights and warm, sunny days, but with strong afternoon west winds. Aucanquilcha

is much colder and windier. Minimum temperatures at Ollagüe reach about minus 5° F., and at Aucanquilcha, minus 35° F. The maximum recorded at Aucanquilcha since 1913 is 36° F. Ollagüe receives two inches of precipitation per year, mainly from December to February. At Aucanquilcha heavy snows fall then and also during June and August, and short, violent



H. R. Cooke, Jr.

MINING WORLD

thunderstorms are frequent, often as afternoon hailstorms.

There is no timber at any altitude, from the Pacific to the top of Aucanquilcha. The driest climate on earth, in the Atacama Desert to the south, extends west of Aucanquilcha in the Pampa del Tamarugal. The one or two measurable rains per decade average less than  $\frac{1}{8}$ -inch per year. Within the last 20 years, however, the climate may have become somewhat moister and warmer. Water is very scarce. The only perennial stream is the Rio Loa, draining southward. The lakes are dry except for a few inches of saline water after rains.

The great height of the Aucanquilcha mine is permitted by the occurrence of rich sulphur deposits in the tropics on a relatively sunny north slope near a railroad in the extremely arid climate, which results in the world's highest snow-line—about 20,000 feet.

The main stock animals are llamas and alpacas, whose principal forage is the ichu bunch-grass covering the lower slopes. Taquia—dried llama dung—and tola heath are used for cooking fires, but the main fuel is yareta, a resinous moss growing in pillow-like masses in rocky outcrops from 12,000 to 16,500 feet high. Its calorific value is 6,300 British Thermal Units per pound—half that of bituminous coal. It apparently is an Ice Age relic, growing very slowly if at all in the present climate, for wherever cut it fails to grow again. It is claimed, like mineral land, and mined with dynamite to break it into chunks for transport.

#### Andes Sulfur Belt

Scattered volcanic sulphur deposits occur near the crest of the Andes along nearly their entire length of over 4,000 miles—the world's longest mineral province. The richest sector is the Andes Sulfur Belt, extending 1,600 miles from southern Peru to near Concepcion, Chile, with 157 deposits and 41 mines known as shown on accompanying map.

Ore rarely is developed much ahead of mining, so most estimates are only guesses on possible reserves. However, at least 17 deposits appear to have over 2,000,000 short tons each of plus 50 percent sulphur. The total reserves in the belt, allowing for several hundred unnoted deposits, probably exceeds 500,000,000 short tons. Important mines include Aucanquilcha, Santa Rosa, Tacora, Chupiquina, Tutupaca, Paucarani, San Pablo, Polan,



Co. Aucanquilcha during the dry season showing caliche outcrops, some workings, and three monocable aerial trams. The cabin on the summit is probably the highest house in the world. (Photograph by Raul Carrasco)

Sacié, and, south of Santiago, Azufre.

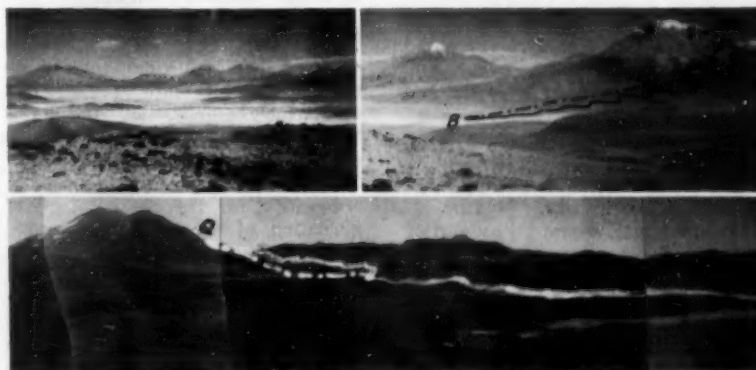
#### Mining in the Ollagüe Area

At Santa Rosa, on the Ollagüe railroad, caliche occurs within an area of 2,000 acres in three nearly parallel beds, up to 6 feet thick, of tuffs and rubble, dipping about 40° south, slightly steeper than the present slope. "Caliche" as applied to sulphur means "ore," so the minimum grade implied varies from about 45 percent sulphur, as at Aucanquilcha, to 60 percent or more, in smaller mines. It is mined in three grades—50, 60, and 80 percent sulphur. An aerial tram in sections of one mile (bicable) and seven miles (monocable) moves the caliche to the Buenaventura plant,

which is similar to the Aucanquilcha plant and produces about 330 tons of refined sulphur per month. Other nearby sulphur mines are largely unmechanized. Probably the highest road in the world is that to Putana, which reaches 18,500 feet altitude.

#### Aucanquilcha Sulfur Deposits

Several thousand acres of caliche occur near the crest of the north slope of Aucanquilcha, where it is subject to rapid erosion. Even though recent geologically, the superficial deposits now being mined may have formed under some cover. They are of xenothermal type, deposited largely as open-space fillings from H<sub>2</sub>S- and/or SO<sub>2</sub>-bearing gases due to decreased temperature



Looking northeast (above) from near Amincha the dash-dot line indicates aerial tram and solid line the road from Buenaventura (B) to the Santa Rosa Mine (SR). The picture below shows the lower section of the aerial tram (dash-dot line) and the solid line shows the approximate route from Quilcha (Q) to Ollagüe and of railroad from Amincha (A) to Ollagüe. The mine is just below the saddle at the summit.

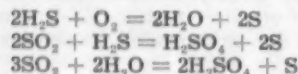


**Table No. 1**  
**The Highest Mines in the World**  
**(Operating Now or Previously)**

Number on Map	Name	Location N. = Northern S. = Southern C. = Central	Metals Mined	Approximate Altitude in Feet
1	Aucanquilcha	N. Chile	S	20,200
2	Capurata	N. Chile	S	19,700(?)
3	Tacora	N. Chile	S	19,350(?)
4	Ascotan (Aral, El Azufre)	N. Chile	S	19,000
5	Putana	N. Chile	S	19,000
6	Chupiquiña	N. Chile	S	18,700
7	Ccollpa	S. Perú	Sb	18,700(?)
8	Tutupaca	S. Perú	S	18,400
9	Chorolque	S. Bolivia	Sn	18,050
10	Cabana	N. Chile	S	18,000(+)
11	Monte Blanco	C. Bolivia	Sn	18,000
12	Laramcota	C. Bolivia	Sn	17,700
13	Santa Rosa (Ollagüe)	N. Chile	S	17,700(?)
14	Caparaja	S. Perú	S	17,700(?)
15	Paucaraní	S. Perú	S	17,650
16	Chacaltaya	C. Bolivia	Sn, Pb	17,450
17	Untuca (Ananea)	S. Perú	Au	17,400
18	El Olca	N. Chile	S	17,400
19	Araca	C. Bolivia	Sn	17,050(+)*
20	San Francisco (Ananea)	S. Perú	Au	17,050
21	Caracoles	C. Bolivia	Sn	17,050
22	Tunapa	S. Bolivia	S	17,000(+)
23	Saciel	N. Chile	S	17,000
24	Santa Rosa	C. Bolivia	Bi, Sn	17,000
25	Porco	C. Bolivia	Ag, Sn	17,000
26	Volcan (Ticlio, San Florencio)	C. Perú	Pb, Zn, Cu, Ag	17,000
27	Concordia	C. Bolivia	Sn	16,750
28	Chofacota	C. Bolivia	Sn	16,750
29	Sucuitambo	S. Perú	Ag, Au	16,750
30	Polan	N. Chile	S	16,750
31	Venturosa	C. Perú	Pb, Zn, Ag	16,750
32	Chimboya	S. Perú	W	16,750
33	Soledad (Quebrada Honda)	C. Perú	Pb, Ag, Au	16,600(+)*
34	Morococha	C. Perú	Cu, Ag, Pb, Zn	16,500
35	San Cristóbal	C. Perú	Cu, Ag, Au, Pb, Zn	16,500
36	San Antonio de Esquilache	S. Perú	Zn, Pb, Ag, Cu	16,400
37	Condorquella (Ananea)	S. Perú	Sn	16,400
38	Cuchilladas (Gibson's)	S. Perú	Cu, Ag	16,400
39	Casapalca	C. Perú	Cu, Ag, Pb, Zn	16,400*
40	Esamoraca	S. Bolivia	Au, W	16,400
41	Aulacaba	C. Bolivia	Sn, Pb, Zn, Ag	16,400
42	Condor (Quebrada Honda)	C. Perú	Pb, Ag	16,400
43	Vesubio (Quebrada Honda) (Olivetti)	C. Perú	Pb, Ag	16,400
44	Pompey (Quebrada Honda)	C. Perú	Pb, Ag	16,350(+)
45	Arequipa (Quebrada Honda)	C. Bolivia	Ag, Sn	16,050
46	Potosí	C. Bolivia	V	16,000
47	Minasragras	C. Bolivia	Ag, Sn	16,000
48	Colquechaca	N. Chile	Cu	16,000
49	Poderosa	C. Perú	Ag, Au, Pb, Cu, Zn	16,000
50	San Genaro (Quespesina)			

- a. Old Spanish (Sara and Liberal adits) were overrun by San Francisco glacier but are now uncovered by retreat of ice. Ice may still cover some higher workings.  
b. In 1949 ice falling from a glacier killed 13 men and demolished surface installations.  
c. Old slopes may reach higher. Highest vein outcrop is 17,000 ft.

and pressure on nearing the surface. Some possible reactions are:



The caliche consists mainly of beds of tuff or lapilli impregnated with interstitial sulphur, as in many other Andean sulphur deposits, and dips about 350° north, roughly parallel to the surface. It has over 45 percent sulphur, with beds 3 to 15 feet thick of 90 percent. Many large bodies of nearly pure sulphur fill fissures in rock shattered by earlier explosive volcanism, and probably represent, in part, sulphur which was remelted near vents and then redeposited. Some high-grade sulphur probably formed by replacement or by filling of gas-dissolved cavities. Most thick, unfractured lava flows of quieter volcanism are barren, though some contain 10 to 15 percent sulphur in pores, vesicles, or partings. A broad aureole of bleached rock (tiza), with local

gypsum, anhydrite, and alums, always surrounds caliche but also occurs without associated sulphur. It is due to removal of iron or alkalies of the rock by solfataric emanations, as  $\text{H}_2\text{SO}_4$  oxidized from  $\text{H}_2\text{S}$ .

#### Deposition Continues

The volcanics forming the mountain are mainly late Tertiary or Quaternary andesitic porphyry. Volcanism and sulphur formation continue, even masking effects of Quaternary glaciation and probably accounting for the general lack of glaciation of the sulphur deposits. On Irruputuncu, Olca, Aucanquilcha, Ollagüe, Putana, and San Pedro mountains, sulphur still is being deposited by fumeroles as surface coatings around vents. On the lower slopes near Ollagüe are recent volcanic cones. Near the sulphur deposits of Yucamani, Sajama, Caiti, Empexa, and Toconce (Tatio geysers) are thermal springs, mainly alkaline sulfate or bicarbonate.

Most of the sulphur mined has come from open-cuts, which since 1913 have produced about 1,200,000 tons of caliche averaging 55 percent sulphur. Underground mining, begun in 1947, within a few months produced 5,500 tons of 80 percent caliche from about 100 feet of workings, before mining was suspended. In 1950 the production per month was 1,100 tons of 85 percent caliche and 1,100 tons of 65 percent. The reserves are estimated at 4,000,000 tons of caliche of 60 plus percent sulphur, and many times this tonnage of 40 plus percent. They might be greatly increased by exploration for deeper, concealed caliche beds.

#### Soroche—Mountain Sickness

Andean man is a distinct type, with hereditary adaptations to high altitudes. Lowlanders coming to the Andes tend to acclimate similarly but less completely. The main change is an increased red corpuscle count from 5,000,000 to 6,000,000 or 7,000,000. One usually notes the scarcity of oxygen on ascending to 10,000 or 12,000 feet when engaging in strenuous activity. At 15,000 feet anoxemia, an abnormal blood condition brought on by respiratory difficulties, becomes marked and at 25,000 to 35,000 feet, fatal.

The symptoms of mountain sickness, or soroche, vary greatly, from mere shortness of breath to headaches, lethargy, chills, nausea, or dizziness during the first day at the high altitude. Either insomnia or extreme sleepiness, prostration, coma, and psychological effects resembling those due to drinking—emotional instability, overconfidence, decreased acuity, and slackening will power and concentration also characterize soroche sufferers.

Normally, noticeable ill effects disappear in a day or two, leaving only short breathing upon exertion to recall the altitude. On descending, adaptation to lower altitudes is equally rapid, so on the next ascent re-acclimation is again necessary.

Quilcha, the mine camp, which is 17,500 feet high, must be near man's living ceiling. Formerly the camp was a thousand feet higher, but the miners could not sleep well there and lost weight, so it was moved down to its present site. There the miners may play football after climbing on foot to the mine, working seven hours, and running down the mountain. Some lowlanders live healthily for several decades at over

**Legend**  
(All items in each section are arranged from north to south on adjoining map)

#### Mountain Ranges

Symbol	Name
CN	C. Negra
CB	C. Blanca
CO	C. Oriental
CH	C. de Huachon
CHh	C. de Huayhuash
MA	Maritime Andes
CV	C. de Vilcabamba
NV	Nudo de Vilcanota
CCb	C. de Carabaya
CCp	C. de Apolobamba
CM	C. de Muñeco
CR	C. Real
CHz	C. de Huanzo
CAm	C. de Ampato
CCa	C. de Chala
AT	Alto de Toledo
CO	C. de Quimsa Cruz
CO	C. Occidental
CF	C. de los Frailes
CDk	C. Domeyko
CA	C. de los Andes
CCI	C. de Callalaste
CD	C. Delos
COv	C. de Oliva
COT	C. de Ollita
CNB	C. Nahuebuta

#### Individual Peaks +

Map No.	Name	Altitude in feet
I	Nev. de Huascarán	22,205
II	Nudo Coropuna	21,700
III	Nev. de Ancohuma	21,500
IV	Co. Illimani	21,280
V	Nev. de Sajama	21,360
VI	Co. Aucanquilcha	20,280
VII	Co. de Tocopuri	(?) 22,160
VIII	Co. Licancaur	19,460
IX	V. Lullillallaco	22,020
X	Nev. Ojos del Salado	22,580
XI	Co. del Potoro	20,940
XII	Co. Mercadería	21,900
XIII	Co. Aconcagua	22,850
XIV	Co. Tupungato	21,500

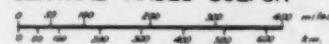
#### Volcanic Sulphur Deposits

##### Mines ▲ Prospects \*

Map No.	Name
101	Carhuarazo
102	Palla Palla (Pucococha, Huayunca, Cotamaylla)
103	Coropuna
104	Ampato
105	Chachani
106	Ubinas
107	Pichu Pichu
108	Tixane
109	Sipincayani
110	Tutupaca × #
111	Yucamani (Candarave)
112	Lopez Extraña
113	Cano, Huaricunca, Tucacosa #
114	Tucupampa
115	Picasane
116	Llailallhue
117	Chajini
118	Isampu
119	Caparaja #
120	Paucarani #
121	Chupiquisha × #
122	Tacora × #
123	Agua Calientes #
124	Inquillani
125	Lexone
126	Timivilque
127	Choqueananta
128	Colpita
129	Caracarani
130	Larancagua
131	Aroma
132	Jarum
133	Tahapaca #
134	Payschatas
135	Gualatire
136	Capurata? × #
137	Puquintica
138	Anocarire
139	Chiguana
140	Surire
141	Purapurane
142	Arentica
143	Mulliri
144	Pumire #

145	Alpajares
146	Isluga
147	Cavaraya
148	Uscane
149	Caraquima
150	Puchulisa
151	Sillajhuay
152	Chapire
153	Huaina-Potosi
154	Cultane
155	Quimsachata
156	Tucurama
157	Porquesa
158	Cancosa
159	Entrecopas
160	Tunapa #
161	Sillilica
162	San Pablo (Napa) × #
163	Caiti (Concepción) × #
164	Empexa
165	Irruputuncu
166	Victoria, San Manuel #
167	Ikaña
168	Chutinsa × #
169	El Oca, La Flecha #
170	Puquols #
171	Casca
172	AUCANQUILCHA × #
173	Miño
174	Coymichi
175	Santa Rosa (Ollaque) × #
176	Cheuviri (Chalhuire?)
177	Polan × #
178	Cañapa
179	Palpana
180	Polapi #
181	Tapaquilcha, Taquija
182	Arcton (Aral, Co. Azufre?) #
183	El Inca (Jardin?) #
184	San Pedro
185	San Pablo
186	Colana
187	Inacuari
188	Cabana (Apagada) × #
189	Leon
190	Liazor
191	Uturuncu ? ×
192	Toconce
193	Tocopuri
194	Putana × #
195	Sacel, Colorado #
196	Curiquinca
197	Saibabur
198	Licancaur
199	Purico ×
200	Pili
201	Lascar
202	Tumisa
203	Tuyacto ×
204	Purichari ×
205	Coransoque
206	Co. Azufre de los Pastos Grandes
207	Incahuasi ×
208	Pular
209	Pajonales
210	Salin
211	Socompa
212	Bayo
213	Chicculay
214	Arcocampa
215	Llullallaco
216	Lastarria (Azufre)
217	Co. del Azufre #
218	Gorbea #
219	Co. de la Azufra
220	Juan de la Vega
221	Co. Inheles
222	Los Gemelos (Salar de Azufra) #

#### CENTRAL ANDES SULFUR



#### EXPLANATION

--- International boundary (Peru not shown, Chilean boundary with Bolivia & Argentina follows cordillera CB, CA, CO, COU, COT, CA)

• Sulfur prospect  
▲ Sulfur mine  
X Other high mine  
— Cordillera  
+ Peak



223	Pedernales, Sierra de Tres Puntos(?) #
224	Piedra Parada
225	Juncalito
226	Colpa #
227	Codecedo #
228	Co. Sin Nombre
229	Copiapo (Co. Azufre) #
230	Negro Francisco
231	Co. Azufre
232	Huasco
233	Overo
234	Co. Azufre ? × #
235	Tinguiririca
236	Co. Amarillos
237	Co. de El Azufre
238	Laguna del Maule #
239	Chilian

#### D. Other high mines

No. 1-50, in order of height. See Table No. I.  
# Has been mined.  
× 2,000,000 tons estimated reserves.

## Sulphur Mines in the High Andes

14,500 feet, but let the Andeans do the hard work.

### The Aucanquilcha Mine

Quilcha is at the end of an 18-mile road from Ollagüe on a high ridge at the north base of Cerro Aucanquilcha. The aerial tram turns at right angles there toward the mine. The miners usually use the tram to commute to the mine. About half are Bolivian Indians, who stand the altitude well, and half Chileans, who are better miners. Most are young men, though some have worked there for over 10 years. At the current exchange they get premium wages for this region—\$0.95 to \$1.65 per day including bonuses.

The open-cuts are on the steep north slope, mostly covered with rubble or snow, so the caliche is mined underhand from benches. It is hand-drilled and sorted, then carried in small movable monocabable aerial trams to the loading bins at the top of the main aerial tram. The backs are sometimes supported by ice pillars formed by routing snow melt-water down sticks.

Underground mining was begun in 1947 at La Cuerta (La Exploradora) on the northwest side of the peak. The caliche is moved to the main aerial tram bins in 2-ton Decauville cars hauled by two Oliver gasoline tractors on a 30-inch railroad about 4,600 feet long, running from the portal, at 19,900 feet altitude, on a one percent down-grade to the bins. Formerly, a 7-ton locomotive was used but the tractors proved superior.

Water for the mine comes from a spring two miles away. Yareta for fuel for both the mine and plant comes from company yareta claims 60 miles away, since nearly all available nearby yareta has been removed.

### Mining Problems

Mining volcanic sulphur in the Andes poses several special problems. The altitude considerably decreases efficiency of men and of most machines, such as gasoline, Diesel, or steam engines, and air compressors. Also of explosives and fuels.

Open-cut mining is especially difficult in the alpine climate, charac-



Looking south from the upper section of the aerial tram to part of the sulphur deposits on the bleached north slope of Co. Aucanquilcha. On the right is the trail to the mine. (Photograph by Raul Carrasco)

terized by cold, extreme daily temperature range, violent snowstorms and hail and thunderstorms, strong frost actions and solifluction, and hurricane-force winds "sand-blasting" the workmen.

When mining, fine sulphur dust irritates the eyes and skin, and SO<sub>2</sub> fumes released from rock openings sear the nose and lungs; miners have been asphyxiated on breaking into exceptionally large underground gas pockets. In places the caliche is still hot. In La Cuerta stopes, at temperatures of 60° to 85° F. the miners work naked. Fires, even matches are dangerous, as sulphur ignites at 478° F. A small fire in caliche may be put out by throwing more caliche or dirt on it, but once well started, the SO<sub>2</sub> evolving makes it extremely difficult to combat until most of the sulphur is volatilized or has melted and run down the slope. Fires in open-cuts have burned for months, and one at Santa Rosa burned for a year.

Cold causes other difficulties, illustrated when mining was suspended from 1947 to 1949. On reopening the mine in October, 1949, nearly all installations were frozen. Snow and ice had to be removed from the tram station at the angle and at the top of the tram, from off the railroad to the portal, and from the portal. The suspended concrete cable weights in the two tram stations were frozen tight in ice, which

had to be dug out to allow them to move. Due to the freezing-in of the weights, two cables had broken near the angle station. When reopening the tram, the miners walked to and from the mine—from 17,500 to 20,000 feet altitude—each day. The climb up took them about an hour and a half.

### The Aerial Tram

The 9-mile aerial tram was built in 1936 at a cost of 9,000,000 pesos, and is the highest in the world. It is all bicable, amounting to 36 miles of 3/4- or 1-inch cable. The upper section, from the mine to the camp, is 5,900 feet long and drops from 19,850 to 17,500 feet altitude. The main section runs eastward from the camp to near Amincha. It is 41,600 feet long and drops from 17,500 to 13,770 feet. Buckets of 880-pound capacity are spaced at intervals of 393 feet and move at about 6.5 feet per second, taking two hours from the mine to the bottom. The capacity of the tram is 26 tons per hour.

The cables are oiled by oil cars with pumps which periodically are sent around the circuit. Five-ton concrete blocks are suspended on the stationary line, and 25-ton blocks on the running line, at four points on each line—top and bottom of the tram, and at the junction of its two sections at the angle. These blocks anchor the cable ends but rise or fall freely with variations in length of the cable due to changes in temperature. Several reinforced concrete towers take up weight on high spots along the main section.

From the bottom tram bin, the caliche is hauled on a 30-inch railroad half a mile to Amincha, the terminus of the company's 1-meter spur railroad, then is transferred to

(Con't. on page 71)

Table No. II  
Comparisons Between Sea Level and 20,000 Feet Altitude

Item	Sea Level	20,000 Feet	Percent of Sea Level at 20,000 Feet
Air Pressure (inches of mercury)	29.9	13.7	46.8
Oxygen (percent of air by volume)	20.75	20.96	101.0
Partial pressure of O <sub>2</sub> (inches of mercury)	6.2	2.9	46.8
Density of air (pounds per cubic foot)	0.07650	0.04075	53.2
Boiling point of water (degrees Fahrenheit)	212	175	82.5
Gasoline and Diesel engines (approximate percent relative efficiency)	100	50	50





Examining a piece of Fremont County uranium ore, in the picture at left, is Neil McNeice, amateur Fremont County prospector who made the first strike early last fall. Holding the tube of a radioactivity detection instrument is W. H. H. Cranmer, president of the New Park Mining Company; on his left is Lawrence Bergsten who owns a group of promising uranium claims in the Crooks Gap area and in the middle background is Don



Moller of Lander, dealer for Precision Radiation Instruments, Inc. In the picture at right, discussing aspects of uranium developments, are Robert Parker, geologist for Metallics Unlimited; Ralph Thurston, a partner in Metallics Unlimited; Sam Bowdich, geologist for American Smelting & Refining Company; Fred Hailey, field engineer and geologist for ASARCO also and Raymond B. Holbrook, attorney for U. S. Smelting.

## Market For Wyoming Uranium Ores Announced At Uranium Congress

Legal technicalities involved in the staking, developing, and obtaining of ownership to uranium claims; reasons for the delay in the issuances of leases and selling permits by the United States Atomic Energy Commission; and the announcement that the United States Vanadium Company will purchase Fremont County, Wyoming, uranium ores were the central points for discussion at the two-day Rocky Mountain Uranium Congress held June 25 and 26 at Lander, Wyoming under the joint sponsorship of the *Wyoming State Journal*, Lander newspaper, and the Wyoming Natural Resource Board.

Most of the 225 persons that attended from throughout Wyoming and 12 other states already have a number of uranium claims in the state or have been prospecting for some time. Because of this fact, the majority of the questions asked were concerned with legal points involved in securing and developing uranium claims.

### Legal Aspects of Claims

Several legal experts helped explain technicalities to the crowd. They were H. J. Vander Veer, minerals officer for the Salt Lake City area office of the Bureau of Land Management; Raymond B. Holbrook,

attorney, United States Smelting, Refining and Mining Company of Salt Lake City, Utah; and Robert Toole, chief of the leasing branch of the mining division of the AEC with offices at Grand Junction, Colorado.

A meeting of great value to attorneys and, thru them, holders of uranium deposits was the mining law session for attorneys only. More than 40 attorneys from throughout the Rocky Mountain area heard talks by the above three men and then engaged in a question and answer period, the entire meeting lasting more than three hours. Several of the attorneys said it was the best such meeting that they had attended.

Wyoming uranium claim owners reported that for the most part their operations were being delayed pending the receipt of tract leases as provided under Circular No. 7 of the United States Atomic Energy Commission's Domestic uranium ore buying program and/or the selling permits from the AEC. They were informed by AEC officials that the leases and permits were being processed as rapidly as available personnel and adequate investigations would permit.

At least two Fremont County uranium mines are in operation at this time, although on a limited basis. Most operators are awaiting receipt

of their leases and permits before going ahead with development and mining plans.

### Market for Ores

T. S. Ary, field engineer for the United States Vanadium Company of Grand Junction, Colorado, announced at the meeting that his firm will start at once to buy Fremont County and other central Wyoming uranium ores for shipment from Shoshoni over the Chicago and Northwestern Railroad to its Rifle, Colorado, Mill. It also was revealed that the company would pay the freight from Shoshoni to its mill on all ore assaying 0.30 percent or more  $U_3O_8$ .

The announcement by USV is expected to stimulate development of county uranium deposits, since trucking charges to the nearest AEC buying station at Edgemont, South Dakota, would absorb much of the selling price of the ore, except for high-grade material.

Since Shoshoni is less than 50 miles from most of the county deposits, owners and developers of these deposits will be able to more easily compute transportation and mining costs for operation of their properties. The free freight from Shoshoni to the Rifle mill is expected to reduce their costs considerably.

# Grave World Conditions Dictate Need For Hemispheric Mineral Cooperation

By Charles Will Wright

Consulting Mining Engineer  
"World Mining Consultants, Inc."  
Washington, D. C.

During the last decade United States' government agencies have taken relatively little interest in the mining industries in Latin America. At the beginning of World War II the Board of Economic Warfare and the Metals Reserve Company sent technicians and purchasing agents to Latin America to help build up the mineral output and to buy the products for our defense industries. But when the war was over most of this activity was stopped and the purchase contracts cancelled. Since the war our government, through the Foreign Economic Administration and the Defense Materials Procurement Agency, has given its principal attention to the Eastern Hemisphere. It is now necessary, for our own welfare, that our government and our mining companies look to the future and take a keener interest in the Latin American supply sources which will be needed to maintain our growing industries and reduce Western Hemisphere dependence upon the Eastern Hemisphere for many of its mineral requirements.

## Encourage Foreign Capital

Because of the risks involved in most of the Latin American countries, little local capital is available for mining ventures. Most of the mines are owned and operated by foreign companies through subsidiaries. Foreign capital hesitates now to invest in Latin American countries generally as the present taxes and exchange controls discourage such investment. However, certain Latin American Republics now realize the value of their underground wealth and its decisive importance to national development. They have or are adjusting their mining codes to encourage capital investment in the development of their mineral resources through private enterprise and in the establishment of industries based upon the use of these mineral supplies. The outstanding

changes in the mining code of Peru, to encourage private investment, is an example for the other Republics to follow.

## Present Situation

After World War I, Germany, Italy and Japan spent huge sums in the development of marginal mineral deposits, even though production costs were well above the world market price level. Today Russia is spending lavishly, not only in developing its sources of mineral supply but in acquiring and stockpiling metals and minerals from abroad, in an attempt to prevent the United States from acquiring the metals and minerals in which it is deficient. In case of war Russia is in a strong position, with its submarines, to shut off shipments to the United States from overseas countries and we would then be dependent upon Mexico and Canada and our limited stockpiles to meet the demands of our defense industries. Thus the development of the sources of mineral supply in Latin America is essential not only for peacetime economy but for military purposes during times of national peril.

## Soviet Infiltration

Recent reports from Argentina and Brazil show that the Soviet Bloc is gaining a foothold in these countries. Trade agreements have been concluded with Czechoslovakia, Poland, and Rumania for raw mate-

rials, including minerals and oil in exchange for machinery and consumer goods. Although this trade is comparatively small it offers credit facilities and other inducements unattractive to our exporters. Neither Argentina nor Brazil can import advantageously from the United States because they are unable to get the needed dollars through export for trade with the United States.

At the beginning of World War II, Germany and Japan were buying most of Brazil's strategic minerals. The Metals Reserve Company in 1941 contracted for the entire output of these strategic minerals and thus prevented further shipments to enemy countries. We are now facing a similar situation in reference to shipments from Latin American to countries under Soviet control.

## Mineral Re-Survey Necessary

Trade between Latin America and the United States is vitally important if we are to have continued peace and prosperity within the Americas. But first we should have up-to-date reports on the present and potential minerals output in each country south of the Rio Grande, as such reports will indicate better ways to build up each nation's balance of trade. A survey of the principal sources of mineral supply in Latin America was made by the U.S. Bureau of Mines from 12 to 14 years ago and these data  
(Continued on page 75)

United States Production And Imports For Consumption From Western and Eastern Hemispheres of Some Essential Metals In 1952 and 1953

Metals	Domestic Production		Imports		Imports		Percent From	
	1952	1953	Western Hemisphere	1953	Eastern Hemisphere	1952	Western Hemisphere	1953
Manganese ore <sup>1</sup>	101,000	160,000	580,000	745,000	2,072,000	2,556,000	21.9	22.5
Chromite <sup>1</sup>	21,000	59,000	98,000	87,000	1,611,000	2,139,000	5.7	3.9
Tungsten <sup>1, 2</sup>	7,611	9,368	5,352	5,011	11,600	8,951	31.6	35.8
Nickel <sup>1</sup>	633	602	111,902	118,924	6,000	11,106	95.2	91.7
Cobalt <sup>1</sup>	681	629	186	394	7,463	8,570	2.2	4.4
Copper <sup>1</sup>	925,000	925,000	525,000	490,000	89,000	178,000	85.5	73.4
Lead <sup>1</sup>	390,000	335,000	423,000	349,000	208,000	207,000	67.0	62.7
Zinc <sup>1</sup>	666,000	534,000	508,000	600,000	54,000	146,000	90.3	80.3
Antimony <sup>1</sup>	2,160	372	8,700	8,554	4,106	1,897	67.9	81.8
Tin <sup>1</sup>	85	75	12,639	18,571	94,133	91,362	11.3	16.9
Mercury <sup>1</sup>	12,547	14,337	8,000	12,475	63,855	69,918	11.1	16.1
Bauxite <sup>1</sup>	1,667,000	1,582,000	3,478,000	4,389,000	20,000	0	99.4	100.0

<sup>1</sup> Short tons. <sup>2</sup> 60 percent WO<sub>3</sub>. <sup>3</sup> Flasks. <sup>4</sup> Long tons.



## **"We get the best performance from CAT\* Engines"**

That's what Fred McLane, vice president of S. E. Evans Construction Co. of Ft. Smith, Ark., says. He adds, "We plan to buy principally Cat equipment in the future." The company has three construction units, for the most part Caterpillar-equipped. Working in the iron ore fields near Linden, Texas, this excavator loads 70,000 tons of crude ore producing 20,000 short tons per month of concentrates ranging from 46 to 47% iron. The crude ore is taken from a virtually unlimited supply.

The performance of the Caterpillar D386 Engine in this Manitowoc model 4500 dragline is one reason for the company's satisfaction with Caterpillar equipment. The husky 400-HP diesel replaced *two* engines of another make. "We now have plenty of power," says operator J. T. Hall. And it's steady, reliable power. The big rig, with 83-foot boom, loads 250 wagons a day, filling each one with three passes of its bucket.

In its first 1900 hours of operation, the rugged Caterpillar D386 has needed no repairs. S. E. Evans Construction Co. expects many more thousands of hours of dependable, economical work life, thanks to such Caterpillar features as specially hardened crankshaft journals, long-lived aluminum

alloy bearings, and efficient filters and seals. Important in cutting costs is the ability of every Cat Diesel to deliver full and *foul-free* power on inexpensive No. 2 furnace oil.

There are 12 sizes of Caterpillar Engines and Electric Sets, to 500 HP and 315 KW. Leading manufacturers can supply Caterpillar power in their excavators and other mining machinery. And you can get replacement power from your Caterpillar Dealer—who will help you cut costly down time to a minimum with fast, skilled service and genuine, high-quality parts. Ask him today to help you select the rugged yellow engine that will do the most work for you at the lowest cost.

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## ACTIVITIES OF U. S. MINING MEN

**EDMUND C. BITZER**, metallurgical engineer, resigned last month as metallurgical adviser for the U.S. Atomic Energy Commission's Division of Raw Materials, Washington, D.C., and returned to Golden, Colorado where he will be engaged in his own consulting practice. During his years with the AEC, Mr. Bitzer covered various parts of the world, including Africa, where he conducted investigatory projects for the commission.



**H. F. van der Laan**, vice president of Tin Processing Corporation, assumed management of the government-owned Texas City smelter which the company operates July 1. The plant is expected to continue operations for at least another year, although ore supplies will be limited. **Alexander ter Braake**, president of the firm, who previously acted as manager for the smelter, has announced that he will devote most of his time to a study of the possibilities of taking over the smelter from the government and operating it on a private basis.

**George Mixer**, executive vice president for United States Smelting, Refining and Mining Company, has retired. He is continuing his association with the firm as a director and member of the executive committee.

**Rollin P. Smith**, plant manager for Titanium Metals at Henderson, Nevada, has been transferred to New York City where he will become assistant to **Alex Stewart**, director of research for National Lead Company.

**Elton Hoyt II**, senior partner, Pickands Mather & Company, was awarded the Gary Memorial Medal for "distinguished service to his country, to his industry, and to the free world in maintaining the steady uninterrupted flow of essential iron ore during periods of both peace and national emergency" at the annual dinner of the American Iron and Steel Institute in New York City.

**W. C. Page**, official of United States Smelting, Refining, and Mining Company, was re-named chairman of the natural resources committee of the Utah Association of Chambers of Commerce.

**Thor H. Kiilsgaard**, project chief for DMEA activities of the U. S. Geological Survey in Region II with headquarters in Spokane, Washington, has been promoted to staff assistant to the chief of mineral deposits of the USGS in Washington, D.C.

**Jack S. Roper**, former manager of Howe Sound Exploration Company's Snow Lake mine, Manitoba, Canada, has succeeded **John J. Curzon** as manager of the Chelan Division of Howe Sound Company at Holden, Washington. Mr. Curzon resigned after 15 years at Holden.

**Rex R. Loyd**, director of the Boulder City, Nevada, Bureau of Mines has resigned and will join the staff of Titanium Metals Corporation of America at Henderson, Nevada. One of the nation's outstanding electrometallurgy authorities, Mr. Loyd has been at the plant for 15 years and during that time has played a leading role in the development of the titanium process.

Three new engineers at the Bonnie chemical plant of International Minerals & Chemical Corporation in Florida are: **Robert Safford**, plant engineer, formerly chief technologist for National Petro-Chemicals Company in Tuscola, Illinois; **John H. Perkins**, mechanical engineer, previously with Monsanto Chemical Company, Anniston, Alabama, and **John H. Snyder**, maintenance supervisor, formerly with American Viscose Corporation, Parkersburg, West Virginia. New mine foreman at the company's Peace Valley Mine is **William C. Cross**, who held a similar position at Kennecott Copper Company's New Mexico operations.

**Frank L. LeQue**, head of the Corrosion Engineering section in New York, has been elected vice president of International Nickel Company, Inc. and manager of its Development and Research division.

**Bernard N. Zimmer**, vice president of the American Metal Company, Ltd., retired June 1 after 40 years service with the firm. Until recently he was president of Blackwell Zinc Company, Inc. and American Zinc & Chemical Company, subsidiaries of American Metal. Mr. Zimmer will continue his association with the company as a member of the board of directors.

**Joseph Brubaker** has been named to head a new industrial engineering department at Kennecott Copper Company's Chino Mines division in New Mexico. Mr. Brubaker formerly was chief of the methods and standards branch, Ogden Air Material Area, at Hill Air Force Base in Utah.

New mining engineers with the United States Gypsum Company include **Thomas Oates**, **Charles Swingen**, **Loren Ziech**, and **Grant Collins**, all May graduates of the Wisconsin Institute of Technology.

**R. R. Weideman**, who recently made a survey of the Moab, Utah, uranium area, has been appointed mine manager and superintendent for the Inspiration Lead Company, which is carrying on exploration and development work at properties near Wallace, Idaho, and Troy, Montana. Mr. Weideman was mine manager of the Silver Dollar Mining Company from 1946 until this year.

**Kenneth L. Cook**, associate professor and head of the department of geophysics, University of Utah, was recently appointed to the Executive Committee of the Mining, Geology, and Geophysics division of the American Institute of Mining and Metallurgical Engineers.

**JAMES P. POLLACK**, for 12 years an exploration geologist with the American Smelting and Refining Company both in the southwestern United States and in Peru, has been appointed chief geologist for Calumet & Hecla, Inc. With offices in Calumet, Michigan, Mr. Pollack will direct the firm's explorations in the Colorado Plateau region and elsewhere. He also has charge of the geological work being done on the company's copper properties in the Keweenaw Peninsula of Michigan and in its zinc and lead properties at Shullsburg, Wisconsin. He succeeds **THOMAS M. BRODERICK** who retired after 34 years with the metal producing and fabricating firm.



**J. D. McAuliffe**, operating engineer for The M. A. Hanna Company, was appointed superintendent for the company's Wauseca iron mine in Michigan.

**Robert Baxter**, assistant general pit foreman at the Pickands Mather & Company's Mahoning iron mine, has been transferred to the Erie Mining Company operations near Aurora, Minnesota. He will act as general pit foreman at his new location. Pickands Mather is the operating agent for the firm, which is owned by Bethlehem Steel Corporation, Youngstown Sheet & Tube Company, Interlake Iron Corporation, and Steel Company of Canada. Another Pickands Mather transfer was **Oliver Axelsson**, mine captain, from the Buck Iron mine to the Albany mine at Hibbing, Minnesota.

**Julian W. Feiss**, staff geologist for Bear Creek Mining Corporation, exploration subsidiary of Kennecott Copper Corporation, has been making a tour of the firm's western field offices. Before joining Kennecott two years ago, Mr. Feiss was assistant to the director of the U.S. Bureau of Mines in Washington, D.C. He is now stationed at Kennecott's New York office.

**Joseph H. Taylor**, vice president and general manager of the Peru Mining Company, and **Jerry Faust**, assistant manager, recently conferred with **Morris Bloomberg**, president of the Illinois Zinc Company, when the latter was in Silver City, New Mexico, inspecting properties of the Peru firm and of the New Mexico Consolidated Mining Company.

**R. C. Mahon**, superintendent of the Homer and Wauseca iron mines of the M. A. Hanna Company, has retired. He will act in a consulting capacity in connection with Hanna's iron mining operations in the Iron River district, Menominee iron range. (Continued on page 88)

## ACTIVITIES OF INTERNATIONAL MINING MEN

**ROSS MCRAE**, an Australian metallurgist, is on a visit to the United States. While in San Francisco, he stopped at MINING WORLD to learn of important metallurgical centers in the U.S. Mr. McRae studied at the School of Mines at Kalgoorlie, Western Australia. He was assistant assayer at Lake View and Star Ltd.'s mine there, and, more recently, he was assistant metallurgical engineer at the South Australian Government's uranium mine at Radium Hill.



In New York City recently for the Brazilian Government Trade Bureau display were Francisco de Sa Lessa, president of the Vale do Rio Doce Company, Brazilian iron ore export firm, and J. Filgueiras Filho, Brazilian minerals expert and organizer of the minerals and semiprecious stones exhibition at the display. The showing was held during the month of June at the Brazilian Government Trade Bureau.

**W. M. Warren** has been named a director for the Tongkah Harbour Tin Dredging Company, Larut Tin Fields, Jelapang Tin Dredging Company and Kundang Tin Dredging Company, all of Malaya. He replaces J. R. Farquharson.

**Hans P. Rechenberg**, geologist for the Bolivian Mining company in La Paz, Bolivia, has accepted an appointment as assistant professor of Mining Geology at the Technical University in Berlin, Germany. Mr. Rechenberg will do consulting work while in Berlin.

**E. M. Willows-Munro**, until recently with South African Lands and Exploration Company, Ltd. in Transvaal, South Africa, is now working for the East Daggafontein Mines in Dagga, Transvaal.

**W. W. Bake** succeeds **A. Sobering** as manager of the Stadacona Mines in Quebec, Canada. Mr. Bake has been mine superintendent of Brunswick Mining and Smelting Corporation's Bathurst district operations in New Brunswick. Mr. Sobering's new position is that of chief engineer for Geco Mines in the Manitouwadge district of Ontario.

**Victor Hampton**, formerly manager of the Catavi mine in Bolivia, has returned to the United States.

**Kay W. Foote**, mining engineer, is employed as a shift boss for the Andes Copper Mining Company, Potrerrillos, Chile.

**Shozaburo Nishizawa**, Japanese Mining Company official, recently surveyed developments at the Kaoloon lead mines in Hong Kong. Mr. Nishizawa's headquarters are in Singapore.

**Richmond Temple** has been appointed a director of Kuala Kampar Tin Fields in Malaya.

**Fermin Malaga Santolalla**, president of the Geological Society of Peru, was elected at the group's annual meeting in Lima, Peru. Serving with him will be **Lyndon A. Bell**, vice president.

**Henry U. Duran**, mining engineer for Cerro de Pasco Corporation, has returned to the United States. Until recently he was employed at the company's operations in Yauricocha, Peru.

**Edward Fitzhugh**, chief geologist of the Republic Steel Corporation, has been in Lima, Peru inspecting drill operations at the Acari iron ore deposits. The development work is being conducted by Utah Construction Company for Republic.

**Dean Charles F. Park, Jr.** of the Stanford University School of Mineral Sciences is spending part of the summer investigating Mexican iron deposits for the Bethlehem Steel Company. Dean Park has spent much time on the geology of iron ore and investigated many deposits in Chile several years ago.

**Joseph B. Cummings**, who has directed exploration activities for Potash Company of America in Canada, will act as resident manager for the newly formed Canadian subsidiary, Potash Company of America, Ltd. Chief engineer for the company will be **James Edmunds**, who has been chief mining engineer for the firm at Carlsbad, New Mexico. **Walter P. Gillingham**, mine engineer, and **William L. Donovan**, drilling foreman, will also serve at the new installation.

**Herbert A. Kursell**, former head of explorational operations for the American Smelting and Refining Company, is acting as general consultant for the Marcona Mining Company, W. R. Grace & Company, and the Cerro de Pasco Corporation in Lima, Peru.



Pictured above is part of a group of mining engineers representing the French Iron Miners, who have been sent to the United States for the purpose of gathering information to help them increase the productivity of the French mines. From left to right they are **P. DHENEIN**, general manager, Societe des Mines de Fer de la Mouriere; **L. E. DUPONT**, chief chemist at International Minerals & Chemical Corporation's plant in Carlsbad, New Mexico, which was visited by the group; **M. W. KARTCHNER**, mine superintendent at Carlsbad; **F. CHANDESRIS**, general superintendent, Societe des Mines de Vallery; **E. GERARD**, general manager, Societe des Hauts Fourneaux de la Chiers; and **S. BOUNAKOFF**, general manager, Union Siderurgique Lorraine. While at the Carlsbad installation, the French visitors were particularly interested in the firm's methods of multi-level mining at the property.



**D. B. SAHANA**, Indian geologist, mining engineer, and mica producer, will attend the Indian Standards Institution meeting in Paris, France, during October. Among topics to be discussed at the conference will be the fixing of standards for Indian mica.

Mr. Sahana has been the managing director of S. K. Sahana & Sons, Ltd., one of India's foremost producers of mica, for 25 years. His firm was one of the chief suppliers of the mineral to the Anglo-American Joint Mica Mission during World War II.

**J. T. Chappel**, president of the Chamber of Mines for the Malayan Federation, was reelected at the group's recent general meeting in Ipoh, Malaya. Fourteen other members were elected to the Council of the Chamber at the meeting.

**R. P. Erhlich**, chief metallurgist for Technical Mine Consultants, Ltd., Toronto, Canada, is supervising the new Metallurgical Division, whose offices opened in Toronto recently. The department is currently working on metallurgical treatment studies of the ores from the Rix-Athabasca Uranium Mines, Ltd., the Rexspar Uranium and Metals Mining Company, Ltd., and the Pronto Uranium, and Algom Uranium developments.

**George Hellerich**, mining engineer, is in charge of the recently reopened Big Hurrah Mining Company operations in Solomon, Alaska. Mr. Hellerich, who has had 30 years experience as mining engineer, supervised the Brinker-Johnson dredging operations at Caribou Creek, Alaska, two years ago.

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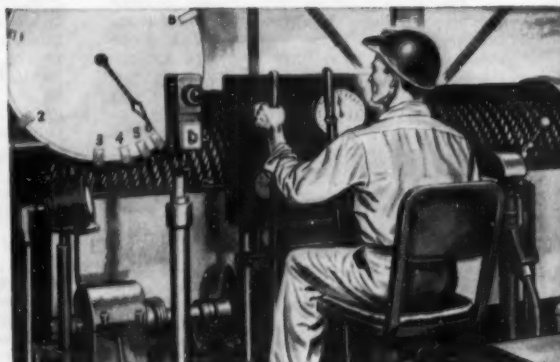
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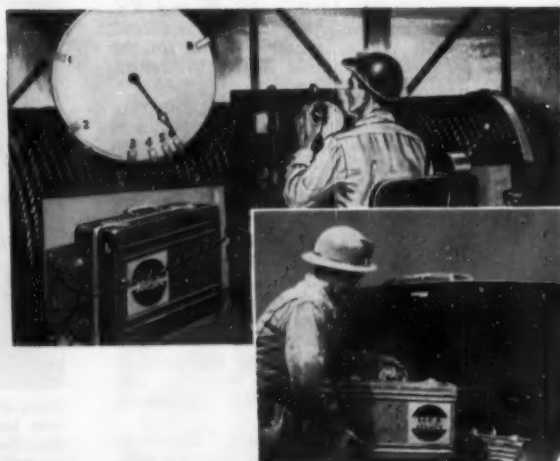
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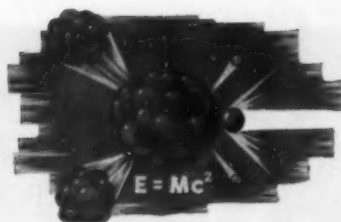
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# FISSION FACTS

Monthly Roundup of Mining News  
In the Atomic Energy Field

## Natural Gas Firms Form New Uranium Company

A new uranium company, Rare Metals Corporation, has been formed by the El Paso Natural Gas Company and the Western Natural Gas Company. Headquarters will be in Salt Lake City, Utah under assistant manager Mitchell H. Kline, who has been head of the Rare Metals Branch of the U. S. Bureau of Mines in Washington, D.C., for the last five years.

The new firm has already obtained leases on a number of School Sections in the Moab, Utah area, and is negotiating for additional claims and leases with private parties. In addition, Rare Metals plans to step up its search for radioactive minerals as part of the parent firm's normal natural gas exploration activities. El Paso already has more than 1,500,000 acres of land under lease in Utah, Colorado, Wyoming, New Mexico, and Nevada which will be checked. Already, surface geologic crews, seismograph parties, and pipeline construction crews are being equipped with Geiger counters to check all formations. This is reportedly the first instance where uranium prospecting has been combined with pipe laying.

Rare Metals will search for and mine uranium ores and also has plans for eventual processing of ores after sufficient ore has been indicated to justify a mill.

## Uranium Found In Three South American Nations

For the past several years the United States Atomic Energy Commission has had geologic crews in South America. These geologists have cooperated with officials of the Peruvian, Chilean, and Bolivian geological surveys in checking reported discoveries, and more particularly have assisted in outlining prospecting methods, and reporting on favorable geologic environment for uranium to both private and government geologists. The Peruvian survey was outlined in MINING WORLD, July 1954, page 77.

Several years ago uranium was discovered in northern Chile and United States AEC geologists checked the deposits. First commercial production from these deposits is now a step closer under a joint United States-Chilean government agreement for exploration and mining of the deposits. Actual work will be done by a new government corporation (State monopoly) to be known as the Radioactiva Ores Corporacion.

Reports of uranium discoveries in both Bolivia and Peru have been made public in recent weeks. Although grades of the ores have not been disclosed, members of the United States Atomic Energy Commission in both countries have confirmed the finds.

In Peru three deposits have been located near the town of Ica in the foot

hills of the Andes Mountains. Named Mario I, II, and III, the deposits were located by five residents of Ica: Enrique Ley Mayo, Felipe Espinoza Sobrino, Juan Jose Maurtua, Luis Pinto Taltaje and Humberto Betolotti. The first three men were also in a party that reported finding very low-grade occurrences on Aguila Mountain a few days before. Members of the U. S. Atomic Energy Commission and representatives of the Peruvian Commission for the Control of Radioactive Substances have inspected the deposits and confirm that the radioactive mineral contains an appreciable amount of uranium.

Location of the Bolivian ores has not been released. It is known, however, that Bolivian technicians and United States AEC officials are conducting investigations in eastern Bolivia and on the plateau.

## National Lead To Operate AEC Raw Materials Lab

The United States Atomic Energy Commission's raw materials development laboratory at Winchester, Massachusetts is now being operated under contract by the National Lead Company. This laboratory is primarily concerned with development of processes for the treatment of uranium ores and the production of uranium concentrates. It was formerly operated by the American Cyanamid Company, and test and pilot plant work at the laboratory have led to commercial scale plants on the Colorado Plateau and other places.

National Lead's wide experience in the mining and concentration field will form an important part in future operations of the laboratory.

## Newest Uranium Companies

### COLORADO

**APOLLO OIL URANIUM COMPANY**  
President: Paul J. Kruesel, Spokane, Washington

Properties in Archuleta County, Colorado, and San Juan County, Utah

**B & F MINING COMPANY**  
Wheat Ridge, Colorado

Directors: Robert Fernandez, William C. Wilson, Clifton Brown

**BLUE MOUNTAIN URANIUM COMPANY**  
Moffat County, Colorado

Uranium claims near Skull Creek, Moffat County, Colorado

**CHEROKEE URANIUM MINING CORPORATION**  
Denver, Colorado

President: James S. Henderson; Vice President: William R. Green; Secretary-treasurer: Carmen J. Ficco

41 claims in Gilpin County, Colorado; Emery, San Juan Counties, Utah, and Sweetwater County, Wyoming

**COLONIAL URANIUM COMPANY**  
Grand Junction, Colorado

President: Robert I. Ludwig

**COLORADO EXPLORATION COMPANY**  
Leases in Martin Mesa area, Colorado

**COLORADO MESA URANIUM CORPORATION**  
Incorporators: L. Allen Beck, Donald W. Brown, Standford L. Hyman, Philip S. Van Cise, Theodore Wendelin

52 claims on Nyswonger Mesa near Berdick, Colorado

**COMMERCIAL URANIUM MINES, INC.**  
Denver, Colorado

President: Ralph E. Simpson, Durango

68 claims in Montrose County, Colorado

**CROWN URANIUM COMPANY**  
Casper, Wyoming

President: John G. Obrecht; Director: Donuil H. Hillis, Denver, Colorado

61 claims in southwest Colorado and southeast Utah

**HIGH PLATEAU COMPANY**  
Grand Junction, Colorado

Directors: Ruth S. Campbell, Harriet A. Spencer, Thomas K. Young

**MURRAY-ZIEGLER URANIUM COMPANY**  
Directors: H. M. Ziegler, E. N. Murray, F. L. Hayes, Peirre E. Parker, Clifford H. Evans

**PAYROCK URANIUM, INC.**  
Grand Junction, Colorado

Directors: C. Earl Roper, Harold E. Roper, Scott W. Heckman

### SAN JUAN URANIUM CORPORATION

Durango, Colorado  
President: R. B. Walter  
Properties in Lightner Creek area, 12 miles from Durango. Exploratory core drilling, production planned

**ULA URANIUM, INC.**  
Denver, Colorado

Directors: A. W. Hutchins, Irene C. Hutchins, E. M. McDowell, E. C. Raines

**URANIUM EXPLORATION DIVISION, HUNT OIL COMPANY**  
Grand Junction, Colorado

Geologist: E. V. Reinhardt  
Claims and leases in Colorado and Utah

**URANIUM PROSPECTORS SERVICE**  
Grand Junction, Colorado

Partners: Mr. and Mrs. A. J. Shea

### NEW MEXICO

**BUCKEYE MINES, INC.**  
Albuquerque, New Mexico

President: V. F. Foy  
9 claims in Silver Mountain mining district, Socorro County, New Mexico

**CANONCITO URANIUM CORPORATION**  
Albuquerque, New Mexico

Prospecting and core drilling program on 16,000 acres on the Canoncito Navajo Reservation 25 miles west of Albuquerque.

Reportedly optioned holdings to Calumet and Hecla Company.

**FOUTZ URANIUM MINING, INC.**  
Albuquerque, New Mexico

Officers: Bert J. Foutz, Mary B. Foutz, Ren Foutz

**URANIUM CORPORATION OF AMERICA, INC.**  
Santa Fe, New Mexico

Officers: Malcolm Cole, Mrs. C. N. Cole, A. O. Trigo

**ZUNI URANIUM CORPORATION**  
Albuquerque, New Mexico

Officers: A. E. Humphrey, T. F. Harrington, J. B. Zucht

### MONTANA

**ELDERADO URANIUM EXPLORATION COMPANY**  
Missoula, Montana

Directors: John B. Hopkins, Kalispell; Pat T. Phalen, Spokane, Washington, Herbert C. Fisher, Missoula

(Continued on page 84)

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## Humble Discovers Sulphur Off Louisiana Coast

Humble Oil & Refining Company has made a sulphur discovery about six miles off the southern coast of Louisiana near Grand Isle. It is apparently the first ever made offshore.

About two years of test drilling will be required to estimate the extent of the deposit. The company plans to sink 20 wells, three of which have already been drilled and a fourth is underway. The firm will evaluate oil and gas deposits as well.

Humble leases the underwater acreage from the federal government. The area is less than 20 miles southwest of the Freeport Sulphur Company's Grande Ecaille sulphur project.

Since Humble's discovery, the Bureau of Land Management of the United States Department of the Interior has invited interested persons to designate areas they would like to have offered for sulphur leasing in the outer continental shelf off Louisiana and Texas. The government then plans to offer to lease blocks, with leases being made on the basis of competitive bidding. Deadline for submitting nominations is August 3 for the areas off Louisiana, and September 3 for the areas off Texas. Leases will probably be offered for competitive bidding on October 13 for the Louisiana area, and November 9 for Texas.

## Australians Prospect For Uranium In Mt. Isa Area

Intense interest is being shown in uranium possibilities in the Mount Isa-Cloncurry area of Queensland, Australia. A number of very promising surface indications have been discovered but have yet to be proved at depth. Australasian Oil Exploration Ltd. recently reported that on its lease near Mt. Isa a lode has been exposed up to 60 feet wide and 150 feet long. Geiger counter readings were obtained up to 10,000 times the background count. An assay sample has been cut from the 60 foot width and miners also took a 10-ton sample across the lode.

Northern Uranium Development N. L. and Uranium Mines N. L. jointly report that they have acquired uranium-bearing leases covering 865 acres in three separate sections on the "White Blow" area, eight miles north-west of Mt. Isa. Samples have shown uranium oxide contents up to 1.0 percent. These two companies also hold 150 acres in the Leichhardt area, 20 miles north of Mt. Isa. The companies propose forming a development group called Western Queensland Development N.L.

## India Selects Orissa As Site for Steel Plant

The long-awaited decision regarding location of India's \$150,000,000 steel plant was finally reached by the Central Government with the selection of Rourkela in Orissa as the most suitable site. This same location had been recommended earlier by a group of experts representing the German steel combine, Krupp-Demag, which will supply technical aid for the project.

Because the new plant will be erected without delay, it was considered necessary by the group that developed and successfully worked raw material sources be on hand. Also, the presence near Rourkela of a cement factory, well-equipped repair shop, and a foundry was, in the experts' opinion, extremely advantageous to the scheme.

Other important areas considered were Bilhail in Madhya Pradesh; Sindri in Bihar; and Durgapur in West Bengal. Private investors are said to be working with the state government in Madhya Pradesh in financing an intensive survey, examination, and analysis of the mineral resources of that state. Particular emphasis will be placed on iron ore and coal deposits to facilitate the economic and industrial development of these resources with the hope that the next steel plant will be erected in Madhya Pradesh.

## World Tin Agreement Gets Needed Signatures

The signatures of Lebanon and Italy on the last day for ratification of the International Tin Agreement have assured its acceptance. Nine consuming countries holding at least 333 votes and producing countries having at least 900 votes were required for ratification. Final total on June 30th, deadline day, was 14 consumer countries having 427 votes, and all six producing countries, with a total of 1,000 votes.

Only West Germany, Brazil, and Switzerland had failed to sign when the time limit expired. The United States had already indicated it would not adhere to the agreement.

A meeting must now be held to decide upon the date the agreement will enter into force.

## Reynolds Begins Multi-Million Dollar Development of Its Aluminum Ore Reserves In Haiti

Reynolds Mining Corporation, a wholly owned subsidiary of Reynolds Metals Company, has begun the development of its aluminum ore reserves in Haiti, according to an announcement by Richard S. Reynolds, Jr., president of Reynolds Metals Company. The announcement followed the return from Haiti of Walter L. Rice, president of Reynolds Mining Corporation, after a conference with President Paul Magloire of Haiti. The President has assured cooperation in the development by Reynolds of this new industry.

The principal deposits of the company, Mr. Rice said, are located about 80 miles from Port-au-Prince near the port of Miragoane. He said a natural protected harbor provides deep water facilities which will accommodate the largest modern self-unloading ore carriers. The deposits are five miles from deep water and extend over an area along a plateau approximately 2,500 to 3,000 feet above sea level. The project in Haiti will cost several million dollars.

Construction equipment has been sent to Haiti to prepare the shore site and to build a 12-mile mountain road descending from an altitude of 3,000 feet. Drying and loading facilities will be installed

at the shore, and a pier will be constructed for loading all types of ore carriers.

In 1944 the Haitian Government and Reynolds Mining Corporation entered into a 60-year agreement to develop this new industry in Haiti. The large deposits of ore were discovered by Reynolds geologists and are similar in character to the deposits in Jamaica, opened by Reynolds in June 1952. A similar grade of ore was also discovered in 1944 in the Dominican Republic. The Haitian project will operate initially at a capacity less than the 750,000 tons in Jamaica, but the installations are being designed to permit a very rapid increase in operations whenever industry conditions warrant.

Reynolds developed the bauxite deposits in Jamaica after extensive research and pilot plant operations, extending over a period of seven years. It began using the Jamaica ore in its alumina plant in Arkansas in the summer of 1952. The ore contains about 48 percent alumina compared with 57 to 62 percent in Dutch Guiana. The company recently completed a new \$40,000,000 alumina plant near Corpus Christi, Texas, designed to process this type of ore.



Place the map showing the location of Reynolds' mining activities on Haiti.

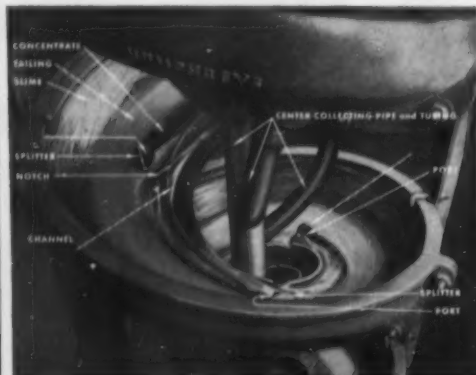


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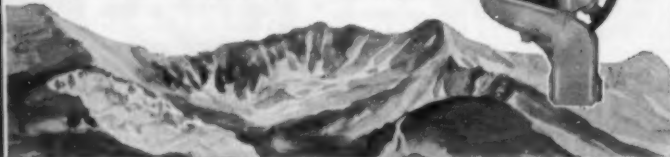
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**KOREA**—The South Korean government plans to sell all state-owned mines, except the two largest tungsten mines, as part of a plan to dispose of all state-managed enterprises. About 391 mines containing gold, silver, copper, lead, zinc, tungsten, molybdenum, graphite, kaolin, fluorspar, anthracite, and lignite will be sold with payment by installments.

**JAPAN**—Nickel will be exported to West Germany under a recent agreement signed by two Japanese firms. The *Sumitomo Metal Mining Company* and *Shimura Kako K.K.* have negotiated contracts which call for exports of 150 tons and 250 tons, respectively. The last large exports of Japanese nickel were to the United States in March when Sumitomo Metal Mining Company shipped 200 tons.

**MALAYA**—Four tin mines are being reopened in the Gambang area of Pahang and should be producing by the end of next year. One mine opened in April, a second will start soon, and the other two will reopen next year. All four mines are owned by Chinese. Gambang was a mining center for many years, with 20 gravel pump mines in operation before the war. Mining was resumed after the war but before it could really be reestablished the emergency started and all except one small mine closed. In 1952 this one ceased operations too. It is expected that between \$50,000 and \$60,000 will be spent on labor and equipment.

**INDIA**—The Indian government is being urged to reduce the export duty on manganese ore as a relief measure for the manganese mining industry. The Madhya Pradesh Mineral Industry Association, in making the request, has called for abolition of the 15 percent ad valorem export tax or at least a considerable reduction. The 200 manganese mines in Madhya Pradesh supply about 70 percent of India's ore exports. In 1953 India exported 1,660,000 tons of manganese ore, about 1,000,000 tons of which came from Madhya Pradesh. At present about 63 mines have closed in the state since the beginning of the year, resulting in the unemployment of 25,000 workers.

**TURKEY**—During the year ending March 1955, Turkey has agreed to send 5,000 tons of chrome ore and 12,000 tons of manganese ore to Yugoslavia.

**MALAYA**—*Sharikat Lumbong Setapak*, a tin mining company, made a net profit of \$130,785 last year. The company's mine is worked on a tribute basis by a dredging firm. The company has acquired additional property near Kuala Lumpur and hopes to acquire 200 acres in Bangi, Ulu Langat district. Arrangements have also been made to rework with gravel pumps the areas already dredged.

**JAPAN**—A British firm, *Imperial Chemical Industries*, has concluded a contract to import titanium sponge from Japan. Japanese output of this metal in 1953 was 70 tons of which 44 tons were exported to the United States. Imperial Chemical has a pilot plant in production in England and now plans to build an-

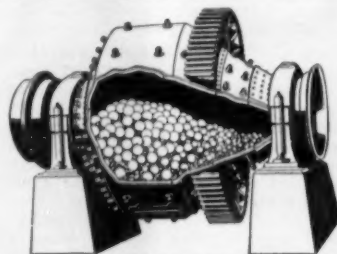
other plant designed to produce about 125 tons a month by the end of 1955. This latter plant will process the metal through to ingot and rolled products.

**INDIA**—About 544,000 tons of industrial clay are available in the Barmer district of Rajasthan, according to investigations conducted by the Geological Survey of India. Three different types of clay are available. Reserves of bentonite are estimated at 344,000 tons, those of white clay and of Fuller's earth at 100,000 tons each.

**MALAYA**—Three iron mines formerly owned by Japanese are being put up for public sale by the Office of the Custodian of Enemy Property. The mines are in Sembrong (189 acres), Mersing (514

acres), and Padang Endau (111 acres). A wolframite mine in Kota Tinggi Johore, formerly Japanese-owned, is also for sale. The mine at Padang Endau is reported to be the only one of the group which was mined before and it was then known as *Bukit Langkap* mine.

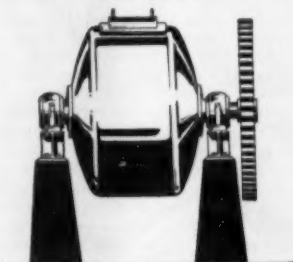
**AFGHANISTAN**—A foreign investment law, the first of its kind in the country, has been passed to encourage foreign investments in mining and other industries within Afghanistan. Under the new regulations, foreign investments will be accorded the same treatment as national capital. Provisions are made for transfer of profits abroad after payment of income taxes and for repatriation of capital. Foreign employees of these companies will



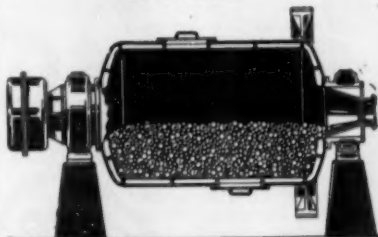
CONICAL MILLS



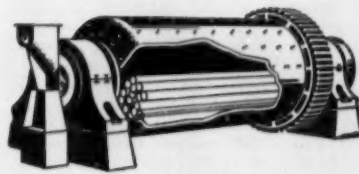
TUBE MILLS



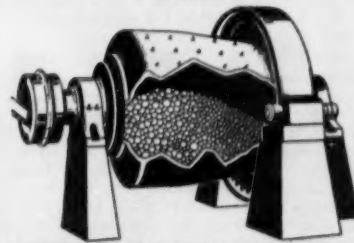
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[World Mining Section—47]

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be allowed to transfer abroad up to 70 percent of their salaries. Foreign capital is defined as foreign currency, machinery, implement and apparatus, and abstract rights, such as licenses, trade marks, patents, and services.

**MALAYA**—Several companies anxious to prospect for tin along the coast of Selangor and Negri Sembilan have been unable to get any action from the state governments on their applications for a prospecting license. Some state government officials feel that prospecting would disrupt the livelihood of the Malaysians who depend upon fishing. Even test drilling might possibly disturb the breeding ground of the fish. The land along the coastal strip is nearly all classified as Malay Reservation which means that none but Malaysians may own the land.



**BRITISH COLUMBIA**—Yale Lead and Zinc Mines plans to enlarge its 150-ton flotation plant to 250 tons. The company's property is on the west shore of Kootenay Lake in the Ainsworth area. The project would cost about \$140,000. Included in the program would be deeper development from the mill elevation, 1,995 feet, to establish a permanent haulage level.

**ALASKA**—As an aid to uranium prospectors, the United States Geological Survey has reopened its Radioactivity Testing Laboratory at College, Alaska, for the summer field season. Lab personnel will determine, free of charge, the radioactivity of samples submitted by the public. Representative samples, about one pound in weight, should be selected for submittal and addressed to: Geological Survey, Radioactivity Testing Laboratory, P.O. Box 4004, College, Alaska.

**ONTARIO**—The Eldorado refinery at Port Hope, operated by the Crown, is undertaking a \$2,500,000 expansion program which will enable Canada to completely process its own uranium supplies. At present, the plant can only convert ore into uranium oxide. It is then shipped to the United States for conversion to metal.

**QUEBEC**—The United States Steel Corporation's Oliver Iron Mining Division has been exploring the Quebec-Labrador region for some time, and test drilling is still underway. The company is reported to hold a number of claims near the railroad recently built by Iron Ore Company of Canada into the interior from Seven Islands. First large tonnages of ore from the Iron Ore Company project are expected to be exported the first of August. Five major United States steel companies will be receiving the ore: Youngstown Sheet & Tube Company, Republic Steel Corporation, Armco, Wheeling, and National, all of whom combined to form the Iron Ore Company of Canada.

**ALASKA**—Many operators are back at their properties for the summer field season. Carl Parker, owner of the Olive Creek Mines, has a crew of men conducting sluicing operations in the Livenood district. Tovia Rosander is at work in the Ophir mining district, and the

Strandbergs have resumed operations in the Manley Hot Springs area. Ed Durand and Frank Thiesen will conduct their first year of operation at their property on Slate Creek. Manie Olson has a crew stripping his Wolf Creek property, while Jack Sullivan is completing assessment work on his ground on Palmer Creek. John Frasca and Bill Haring are sluicing at Eagle Creek, and the Wrede brothers are doing the same thing on Independence Creek.

**QUEBEC**—New Metalore Mining Company has staked an 800-acre lithium prospect in the Val d'Or-Amos area of northwestern Quebec, in the LaCorme township. The location is not far from the property of Quebec Lithium Corporation and New Metalore is watching the progress of exploration work on nearby properties before planning its own work.

**SASKATCHEWAN**—El Bonanza Mining Corporation plans to conduct more exploration work on its uranium prospect in the Beaverlodge area. A number of radioactive areas were indicated in work carried out last year and a Geiger counter survey with more detailed work is planned for this year. At the company's silver property at Great Bear Lake, Northwest Territories, underground work is going on. This season's work includes unwatering one of the two shafts on the property and driving from the 150-foot level of one shaft to the other, a distance of 700 feet.

**QUEBEC**—Casse Copper Mines Ltd. expects to have hydroelectric power available by October, with mine and mill operation scheduled to begin shortly thereafter. Smelter production will follow four months later. Development and preparation for mining of the Needle Mountain ore bodies were continued throughout last year, when exploratory drilling was suspended. Ore intersections made during the year by development openings and by detailed diamond drilling have confirmed grade and tonnage expectations.

**BRITISH COLUMBIA**—Granduc Mines has started this season's work of driving the adit another 2,000 feet into the mountain for a total of nearly 3,000 feet, and 15,000 feet of diamond drilling, of which 11,000 is to be underground, and the rest on the surface. The copper exploration project is a joint operation of Granby Consolidated Mining, Smelting & Power Company Ltd. and Newmont Mining Corporation.

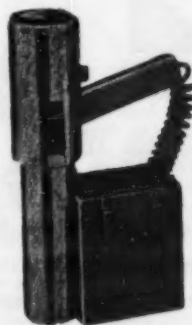
**QUEBEC**—Control of Fenimore Iron Mines Ltd. has been acquired by a group of United States businessmen who have purchased 1,000,000 shares of stock. About \$300,000 more will be spent for drilling, after outcrops and partial drilling indicated about 1,000,000 tons of concentrating ore with an iron content of 30 to 40 percent. With beneficiation, company officials believe the ore could be upgraded to over 60 percent. Cost of concentrating equipment to produce 400,000 tons annually would be about \$12,000,000.

**BRITISH COLUMBIA**—New Arlington Mines has started milling operations in its new 100-ton-per-day plant at its gold property in the Kootenay district. Mill heads have been averaging 0.161 ounce and tailing down to 0.02 ounce per ton.

**SASKATCHEWAN**—Brunston Mining Company is reestablishing its camp in the Beaverlodge area and expects to continue Geiger counter survey, trench-

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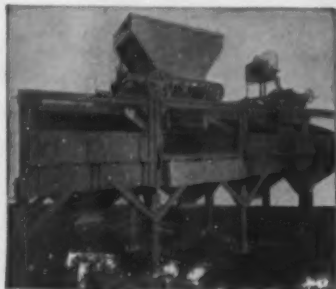
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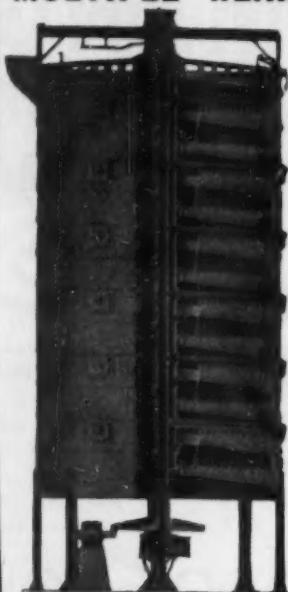


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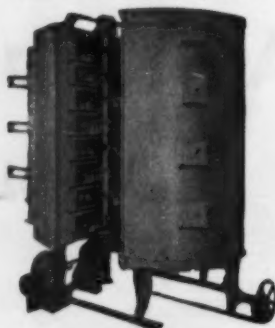
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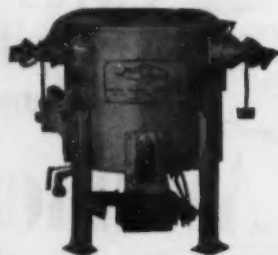
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ing, and diamond drilling this season. Encouraging results were received last fall when drilling was interrupted by a mechanical failure, and then the winter climate set in. The company also plans to explore its base metals prospect in the Bathurst area of New Brunswick, two groups of uranium claims in the Oka area west of Montreal, Quebec, and a 26-claim base metal prospect in northwestern Quebec.

**QUEBEC**—A newly formed company, *Zemke Mining Company*, has been organized in Montreal. Plans for this summer are to carry out 5,000 feet of diamond drilling on a 1,280-acre property in Lacoste Township, eastern Quebec. A magnetometer survey of about 200 acres of the property indicated anomalies caused by high-grade ilmenite.

**BRITISH COLUMBIA**—*Abacot Mines Ltd.* is readying the *Silver Bear* property on Keen Creek near Kaslo for production of silver, lead, and zinc ore. S. Hallgren of Ainsworth formerly operated the mine under lease. On Mount Foley east of Chilliwack, exploration work has been resumed by *Rico Copper Mines Ltd.* at its 6,000-foot-high property. A tunnel is to be extended about 150 feet to get under known copper ore surface exposures.

**ONTARIO**—*British Columbia Explorers (1953)* has started diamond drilling on a 12-claim prospect adjoining the *Pronto Uranium Mines Ltd.* property in the Algoma district. Basic object of the drilling program is to establish the presence and habit of the uranium-bearing conglomerates in which *Pronto* has discovered its ore. A systematic program of exploration work has been recommended for the two *Whiskey Lake* claim groups on which very high radioactivity was discovered in preliminary surface work.

**QUEBEC**—*Eastern Metals Corporation Ltd.* expects to have its first 500-ton unit of a proposed 1,500-ton daily capacity concentrating plant in production early next year. The concentrator will treat exclusively ores from the company's north nickel zone on three levels down to the 450-foot horizon. It is expected that by the time the first milling unit reaches production sufficient work will have been completed in the sulphide zone to permit management to arrive at a decision regarding size of the second milling unit.



**PERU**—*Chavin Mines Corporation*, a subsidiary of *Frobisher, Ltd.*, reports that to date work from adits on three levels has shown some nine parallel branching or cross-cutting structures carrying ore shoots. At the end of last year, underground work had indicated 490,600 metric tons (2,200 pounds) of ore grading 9.1 percent lead, 15.4 percent zinc, 1.3 percent copper, and 4.5 ounces per ton silver. This represents an increase of 60 percent in tonnage over the corresponding figure of a year ago. Since there is now sufficient ore to justify production on a small scale, and since test shipments to a smelter in the area confirmed orthodox treatment methods, plans are now being made to finance construction of a

mill, and also of a road to connect the mine directly with the coast.

**BOLIVIA**—A preliminary "letter of agreement" has been negotiated between United States and Bolivian officials concerning delivery of 12,000 tons of tin concentrates. Approximately 4,300 tons of this is already enroute to the United States at the prevailing world tin price. The additional ore is expected to be used in the Texas City smelter if its continued operation is approved by Congress.

**CHILE**—*Frobisher Ltd.*, together with a base metal associate, is operating the *Mantos Blancos* property, located about 30 miles inland from the port of Antofagasta in northern Chile. A program of diamond drilling, churn drilling, and underground work is in progress to prove an indicated large tonnage of oxidized ore. Present indications are that there is a large tonnage of medium grade ore which would be available for mining by open-cut methods. Production plans will be made when the ore has been satisfactorily proven. In addition to oxidized ore now being developed, there is also reported to be the possibility of a deeper, and richer, secondary sulphide mineralization which will be investigated in the next stage of exploration.

**NICARAGUA**—*La Luz Mines* has completed 100 percent purchase of the *Rosita* copper property 30 miles from its own operations. Mine development will be suspended for a time because of the unsettled political situation in Nicaragua. The *La Luz* mine is currently producing around 2,000 tons a day. During the first six months of its present fiscal year, the company recorded a higher profit than it did in the same period of last year, although less tons were milled be-

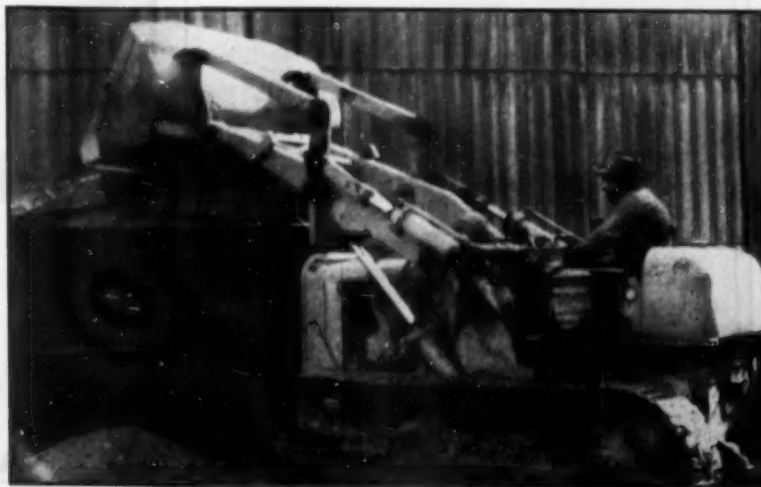
cause of a change over from open pit to underground operations. For the six-month period 363,706 tons were milled to produce 34,706 ounces of gold.

**BRITISH GUIANA**—*Northwest Guiana Mining Company*, a subsidiary of *Union Carbide and Carbon Corporation*, has offered *Barima Gold Mining Co. (Canada) Ltd.* \$625,000 for all mineral rights, other than gold, on Barima's manganese concession in British Guiana. Northwest Guiana has been exploring the property for the last 12 months under an option agreement. The exploration has proved between 4,000,000 and 5,000,000 tons of manganese with an average grade of about 40 percent.

**BRAZIL**—The National Treasury has been authorized to arrange for an increase in capital for *Cia. Siderurgica Nacional*, which operates the *Volta Redonda*, Brazil's largest steel plant. The increase will be about Cr. \$500,000,000, or about \$25,000,000, to be paid up by 20 percent installments. The new capital will be used to provide resources for the second stage expansion project of the company, raising production from its present level of 710,000 tons of ingot steel to 1,000,000 tons a year. Two additional open-hearth furnaces, another battery of coke ovens, and some subsidiary rolling mill equipment will be installed.

**CUBA**—*Cia. Minera Cortes S.A.* of Havana is reported to be conducting open-pit mining in a pyrite-chalcocopyrite deposit in the district of Corral Nuevo, province of Matanzas. The ore is said to assay 48 percent sulphur and 1 percent copper.

**CUBA**—*Basic Refractories, Inc.* is seeking permanent mining concessions



## High Altitudes Need Not Hamper Performance

Pictured above is an Allis-Chalmers HD-5G tractor at work loading ore into a railway car at the Vanadium Corporation of America's Mina Ragra vanadium mine high in the Peruvian Andes. The world famous Mina Ragra, operated by VCA for more than 30 years, is said to be the only patronite vanadium mine ever discovered. Vanadium oxide is processed here and shipped to the United States. Gordon F. Lilly, resident manager in Peru for Allis-Chalmers Manufacturing Company's Tractor Division, recently visited the operation and reported on the exceptional high-altitude performance of the tractor as observed by William Wittmeyer, superintendent of mines. Despite the altitude of 15,468 feet, there was very little loss of power with the HD-5G, and frequent rains did not prevent the equipment from working in very wet mine ore conditions, or in mud often covering the truck wheels. Particularly outstanding in Mr. Wittmeyer's opinion, was the advantage of the A-C 1,000-hour lubrication period for truck wheels. VCA uses two HD-5G's at this project for stockpiling, cleanup work, loading and unloading, and even occasionally pulling loaded ore cars that weigh over 10 tons.



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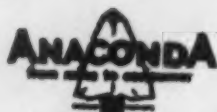
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from the Cuban government in order to develop a promising deposit of refractory-grade chromite.

**BRAZIL**—*Companhia Vale do Rio Doce* increased its production in 1953 to 2,017,355 tons, from its previous high of 1,794,870 tons in 1952. This was an increase of 11.5 percent. Present expansion plans should boost output to 3,000,000 tons annually. Part of the program includes improvement of the *Estrada de Ferro Victoria Minas*, which belongs to the firm. This railroad has received nine Diesel-electric locomotives increasing haulage capacity by over 300 percent. Assays on the 1953 production from Rio Doce showed a 68.8 percent content of Fe and only 0.028 percent sulphur.

**CUBA**—The *Freeport Sulphur Company* has repaid the \$1,100,000 loan granted by the United States government in 1942 to build the *Nicar* nickel plant in Cuba. The plant, one of the world's largest producers, was constructed and operated by *Nicar Nickel Company*, a subsidiary of Freeport at that time. The money was used to help buy surrounding ore deposits to supply the plant. The plant was shut down after World War II, reopened in 1951 because of the Korean conflict, and is still operated by *Nicar*, now a subsidiary of *National Lead Company*.

**MEXICO**—The *National Commission for Stimulation of the Mining Industry* has started to dewater the *Nueva Luz* mine near Guanajuato City. This is the deepest mine in the region, with depths of as much as 2,500 feet. The mine also adjoins the fabulous *La Valenciana* mine which was once one of Mexico's largest silver producers. The Commission hopes to re-establish *Nueva Luz* as a leading lead and zinc producer. It is reported, too, that the Commission plans eventual dewatering and reopening of the *La Valenciana* for lead and zinc, as well as silver.

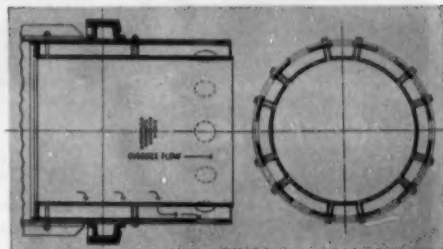
**SURINAM**—The *Surinam Bauxite Company* at Paramaribo shipped 2,529,036 metric tons of bauxite to the United States during 1953, thereby supplying 40 percent of the total U.S. needs for the year. The firm reported a net profit of 8,233,666 guilders last year (about \$4,363,800); about 8,700,000 guilders (\$4,600,000) have been invested in expansion of the company's activities.

**COLOMBIA**—*Asnazu Gold Dredging, Ltd.* reports that for the three-month period ended March 31, 1954 1,187,400 cubic yards were dredged to recover 3,406 ounces of fine gold. In the same period of 1953 1,414,200 yards were dredged to recover 5,590 ounces. No. 2 dredge was permanently closed down on April 12, 1954 and final cleanups are now in progress. *Pato Consolidated Gold Dredging, Ltd.* dredged 6,287,100 yards to recover 49,517 ounces of fine gold during the first quarter of this year; by comparison, 3,650,600 yards were dredged last year to recover 38,789 ounces.

**HONDURAS**—The *New York & Honduras Rosario Mining Company* has closed its famous *Rosario* gold and silver mine at San Juancito after depleting its ore reserves. The company plans to spend an estimated \$600,000 on a thorough exploration of its *El Mochito* silver-lead property in the department of Santa Barbara to see whether the life of this mine can be extended.



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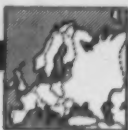
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## EUROPE

**NORWAY**—A/S Norsk Bergverk is steadily increasing production at its Soevle columbite ore fields near Ulefoss, central Norway. The mine and plant are working well. The United States government has contracted to buy from the Kingdom of Norway 396 short tons of  $\text{Cb}_2\text{O}_3$  concentrate at a total price of \$1,765,000. The contract expires on De-

cember 31, 1956. In 1953 41 tons were shipped to the United States, and in 1954 about 60 tons are expected. It has been reported that Norsk Bergverk is considering entering the research field to study the possibilities of ferro-columbite production. Since the company is government-owned, this research expenditure estimated at about 4,500,000 kroner would have to be approved by the parliament.

**AUSTRIA**—The warm and dry weather has permitted an increase in mining activities after delaying winter months. April showed a particular increase with 233,584 metric tons of iron ore mined, 16,505 metric tons of lead-

zinc ore, and 14,352 metric tons of copper ore. Antimony production was 887 metric tons, and magnesite 73,744 metric tons.

**SPAIN**—Under a new trade agreement with the Netherlands, Spain will ship 200,000 tons of pyrite, 120,000 tons of iron ore, 10,000 tons of zinc ore, 3,000 tons of lead, and unspecified amounts of mercury and fluorspar. The agreement runs for a 12-month period; that is, from June 1, 1954 to May 31, 1955.

**YUGOSLAVIA**—A Wemco heavy media separation plant has been installed in the lead-zinc mines at Mezica (Slovenia) and has been in operation since May, giving very satisfactory results. The separator has a capacity of 1,600 tons per day, with the size of the feed at plus-2-, and minus-millimeters. Ferro-silicon is ground to minus-0.2-millimeters and is being used as medium. The density of the separation circuit is approximately 2.7. The ferro-silicon loss has not yet been determined, but a loss of 80 to 100 grams per ton is expected. By adding the HMS plant, a greater tonnage of lower grade ore is treated to yield a higher grade flotation feed. The final result is the doubling of lead and zinc flotation concentrate output. The new arrangement also enables the plant to treat old waste dumps, as well as low-grade ore, with economical results.

**ITALY**—The quicksilver industry is taking full advantage of the increasing demands for the metal on the world market. Italian exports reached 869 tons during the first quarter of 1954, compared with 325 tons during the same period of last year, and 1,901 tons during the whole of 1953. Output of quicksilver ore also increased, with almost 60,000 tons produced during the first quarter of 1954, compared with less than 48,000 tons in the 1953 period. Metal production has not kept pace, however; output was 457 tons or only a 10 percent increase over the first quarter of last year.

**GREAT BRITAIN**—The British are reported to have imported 93,000 tons of manganese ore valued at £1,688,000 from the Soviet Union during the 12-month period ended in May.

**WEST GERMANY**—West German mines produced 4,470 tons of lead in May, as compared with 4,629 tons in April. Sales of zinc in May totaled 8,211 tons which was also below the April figure of 8,484 tons. Zinc production last year totaled 148,000 tons.

**SWEDEN**—During the first quarter of this year, Swedish iron ore exports totaled 2,608,000 metric tons, compared with 2,720,000 in the same period of 1953.

**AUSTRIA**—The Ranshofen Aluminum Works reported full-capacity production for the first time in its history when in April production reached 4,395 metric tons, or only 200 metric tons under the theoretical full capacity. It is expected that during 1954 the overall capacity utilization will exceed the 1953 level; last year after an increase of 6,500 tons over 1952, 37,800 metric tons were actually produced. This level will be surpassed by at least 4,000 tons in 1954.

**GREECE**—The Aliveri lignite mine has already reached a production of 1,500-tons per day and is expected to reach the 2,000-tons-per-day mark, as planned, by the end of this year. All of the output is shipped by rail to the near-

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## INTERNATIONAL

by power plant. The mine was developed by the United States Foreign Operations Administration and the top technical staff is composed of United States, Canadian, and Greek engineers. The latter will assume complete control of operations after the foreign technical team leaves. The mine has modern surface installations with excellent unloading facilities. Underground the main entries are circular, fully concreted openings for the transportation of the lignite by overhead-wire trolley locomotives, pulling 2-ton cars on 60-pound, one meter gauge rails.

**ENGLAND**—A Summer School in Mineral Dressing will be held in the Bessemer Laboratory of the Royal School of Mines in London September 14 through 17, 1954. The course includes lectures covering comminution, classification, grinding control, gravity separation, flotation and ancillary processes, and is illustrated by films, demonstrations, and class work. Fee for the course is 10 guineas.

**WEST GERMANY**—New discoveries of ore deposits were made in the southern federal state of Bavaria in May. Two large iron ore deposits were located between Krumbach and Engelsdorf. Another deposit near Kressenberg was found earlier in the year and it will be studied to determine the possibility for economically feasible mining.

**POLAND**—An iron ore mine in the district of Olkusz which was flooded a decade ago has now been dewatered. Pumping started last September and the mine was ready for installation of equipment in February. The ore reportedly contains 22 percent Fe.

**SWEDEN**—*Boliden Gruv Aktiebolag* is reported to have installed a new sulphuric acid plant at its smelter at Ronnskar. The new plant uses the sulphur dioxide from smelting of copper and lead ores to produce about 30,000 tons annually of 100 percent  $H_2SO_4$ . Capacity may be increased eventually to 50,000 tons.



**PHILIPPINE ISLANDS**—*Hunting Geophysics, Ltd.* is currently aerosurveying six iron localities in the Philippines under contract with the FOA and Philcusa, and also has three contracts with local mining companies for similar work. *Benguet Consolidated Mining Company* will have approximately 72 square miles of refractory chromite property at Masinloc, Zambales aerosurveyed. The property is owned by *Consolidated Mines, Inc.* but is operated under option by *Benguet*. It is hoped that more chromite ore bodies will be located and delimited. *Elizalde & Company* is reported to be having its iron ore property at General MacArthur, Samar aerosurveyed, while the *Mayon Mining Corporation* is scheduled to have its chromite property at Lagonoy, Camarines Sur also surveyed.

**TASMANIA**—Exploration for minerals is to be undertaken in the southwest part of the island. A base is being established at Port Davey, access at present being only by sea or seaplane. The country in the southwest part of Tasmania is ex-

# The tough ones come to Card

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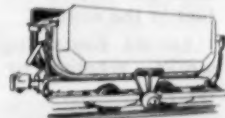
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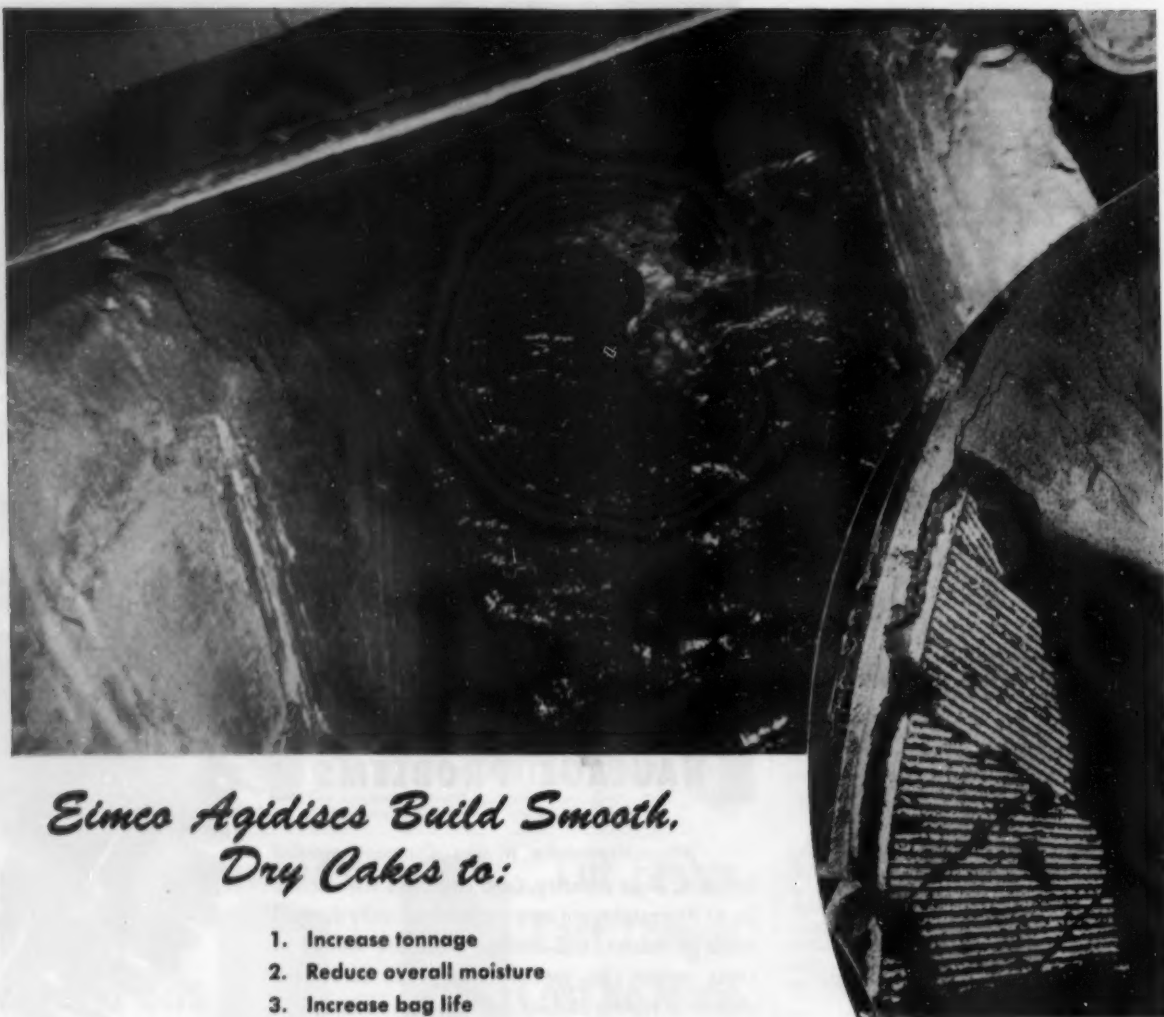
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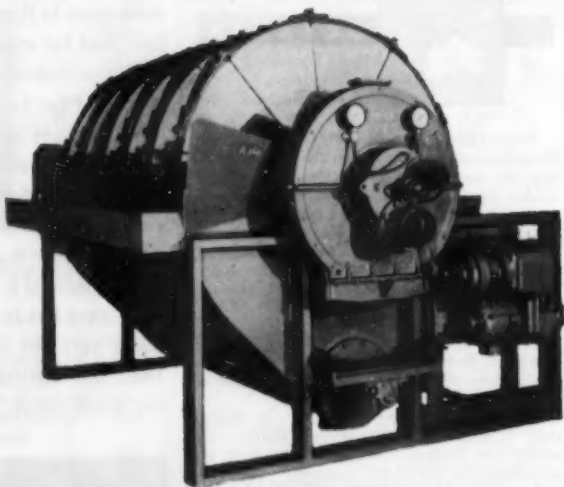
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## INTERNATIONAL

tremely difficult and practically unexplored. Possible metals are considered to be copper, gold, silver, lead, zinc, tin, rutile, and nickel.

**PHILIPPINE ISLANDS—Sulu Minerals** is a Filipino-American company organized to thoroughly explore and develop high-grade copper deposits discovered recently at Port Languyan, Tawitawi Island, in the Sulu archipelago. R. H. Johnson, general superintendent, recently returned from Tawitawi and reported that assay results have shown copper content at high as 28 percent, plus varying amounts of gold and nickel. Mr. Johnson pointed out that the terrain and the deep-water shipping point located within one mile of the ore deposits will reduce ore handling costs to a minimum.

**PHILIPPINE ISLANDS—Lepanto Consolidated Mining Company** used selective flotation separation during the first five months of 1953. The system, which rejects pyrite, was adapted because the increasing iron-copper ratio was resulting in a lowering grade of concentrate. Its adaptation, while involving lower metal recoveries, resulted in an important increase in concentrate grade. However, during the second half of the 1953, the changing characteristics of mill feed included a reduction in pyrite content and particularly a gradual increase in gold values so it again became economic to recover pyrite with the concentrate; therefore, the system was changed back to bulk flotation. The selective circuit was maintained on a standby basis and was used occasionally in September, October, and November when characteristics showed its economic advantages. Following is a comparison of the results of the two types of operations as attained by mill operation during 1953.

### Selective Flotation January to May

	% Cu	Oz. Au/ton
Head	3.62	0.134
Concentrate	29.94	0.879
Tailing	0.37	0.042
Copper	91.0	72.1
% Recovery		

### Bulk Flotation June to December

	% Cu	Oz. Au/ton
Head	4.84	0.183
Concentrate	23.76	0.926
Tailing	0.21	0.033
Copper	95.7	82.4
% Recovery		



## AFRICA

**SOUTH WEST AFRICA—Ventures Ltd.** has assumed management of *Associated Tin Mines* which owns 64 percent of *Uis Tin Mining Company (South West Africa) Ltd.* B. G. Edward has been placed in charge of the mine. The 1,000-ton mill was hampered by water difficulties at the start of its operation, but the situation has improved and in April 20,000 tons were treated.

**FEDERATION OF RHODESIA AND NYASALAND—Tanganyika Holdings Ltd.**, the parent company of *Tanganyika Concessions Ltd.* and *Zambesia Exploring Co. Ltd.*, has entered into an agree-

AUGUST 1954

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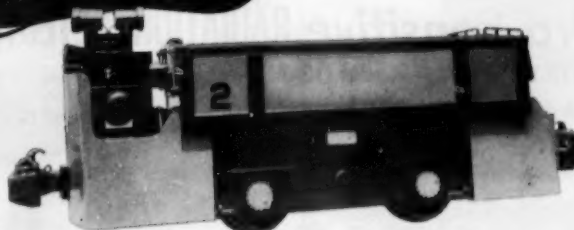
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[World Mining Section—57]



ment with the *Rio Tinto Company Ltd.* to participate with 30 percent in the prospecting and exploration of Rio Tinto's recently acquired prospecting grants in Northern Rhodesia. The group holds an extensive interest in the *Union Minière du Haut Katanga* in the Belgian Congo and controls the *Benguela Railway Company* in Angola.

**GOLD COAST—Konongo Gold Mines, Ltd.** has shown better results in recent months because of a moderate increase in milling tonnage. The grade of ore currently being crushed at its property in the Ashanti district is comparatively high, which means that a small increase in tonnage brings a material improvement in gold output. There is likely to be a further expansion in tonnage of ore crushed to around 3,000 tons monthly. The mill can actually handle 10,000 tons monthly, but the present capacity is only 4,000 because of the introduction of direct cyanidation of high-grade ore. Previously, all ore was treated by flotation. The Boabedroo ore body, which was opened up only within the last few years, and which has provided the high-grade

ore, is reported to be showing a marked decrease in value, though not in extent, downward from the 10th to 12th level. If the grade declines appreciably, it is probable that the company would revert to former recovery practices, stepping up the tonnage to make up for any decline in value.

**UNION OF SOUTH AFRICA—The President Steyn mine** officially entered the production stage in April. Of the total footage of 19,230 feet sampled to March 31, 85.15 percent proved payable averaging 541 inch-dwts; subsequently payable values of 604 inch-dwts. have been disclosed. Most of the development to date has been in the northern and lower grade sections of the mine. As more development headings become available in the other sections, and providing the higher values persist as seems possible, the ultimate milling grade should be higher than indicated by present averages. The company intends to advance surplus development so that larger ore reserves can be proved and made ready for stoping. While initially this will mean milling a high proportion of development

rock, the proportion of stoped ore will gradually increase to the appropriate ratio of development to stoped ore. Milling capacity is being increased to 125,000 tons a month. The uranium plant being erected on the property should be ready for productive operations by the end of the year, when treatment of the mine's slimes will be started.

**FEDERATION OF RHODESIA AND NYASALAND—The Rhodesia Broken Hill Development Company** (Northern Rhodesia) reports that additional solution required for increased zinc output is now being produced by the extended vanadium leaching section of the zinc plant. The completed rectifier installation is providing more power for additional zinc output. The new lead plant was completed during 1953 and though operational runs have progressively lengthened, operational difficulties have not yet been overcome, mainly in the furnace section. A new cadmium refining plant is being constructed for the treatment of the cadmium-bearing residues from the purification section of the zinc plant. Zinc output in 1953 was a record at 25,330 long tons, but lead output was lower than in 1952; no fused vanadic oxide was produced in 1953. Lower metal prices in 1953 more than halved the profits from the previous levels.

**FEDERATION OF RHODESIA AND NYASALAND—Water** continues to cause difficulties in operation of the *Kansanshi* mine of *Anglo-American Corporation of South Africa Ltd.* (Northern Rhodesia). Anglo-American is supervising development work; *Rhodesia-Katanga Company, Ltd.* holds the mineral rights; and a new company, *Kansanshi Copper Mining Company, Ltd.* has been formed to actually work the property. The shaft cut through a large water course at 300 feet and a concrete plug was installed to seal off the water, while development was continued at a higher level. Increased pumping facilities were installed and a small vein of sulphide copper assaying nearly 4 percent was disclosed. Development work has revealed an oxide copper zone about four feet wide, averaging over 5 percent copper.

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## How High Can Mining Go?

(Continued from page 48)

Decauville cars and hauled by two 15-ton steam locomotives seven miles to the plant at Ollagüe.

### The Aucanquilcha Refinery

Water for the plant comes from a spring 9 miles from Ollagüe, near Amincha, over a 3-inch pipeline delivering 13 tons of water per hour. Yareta is used for heating the autoclaves; 600 to 800 pounds is burned per ton of refined sulphur produced.

Treatment of caliche begins with hand-discarding of boulders, which improves the grade about five percent. The ore then goes to an autoclave, where it is immersed for one hour in steam at 265° F. and 60 pounds per square inch pressure. The molten sulphur then is discharged through a valve at the bottom of the autoclave into a cooling pit to solidify into blocks. Pressure in the autoclaves is reduced to five pounds per square inch and the residue which is 35 to 40 percent sulphur, is discharged through a side door to be trammed to the stockpile for flotation.

The eight autoclaves have a total capacity of about 50 tons per day of refined sulphur, 99 plus percent pure. Objectionable impurities are absent or within tolerances except for some shipments in which arsenic and tellurium each have been reported up to about 0.5 percent.

Some of the residue and ore is sold without further treatment to Chuquicamata for use in acid-leaching copper sulfate ore. About 550 tons per year of refined sulfur goes to a roller mill to be crushed to minus-300-mesh for sale as insecticide.

### Flotation Pays

A dump of 330,000 tons of "ripio" was rejected as waste before installation of the flotation plant, but is now being floated to supply refined sulphur. From 1947 to 1949, while mining was suspended, the production of 5,000 to 6,000 tons per year came almost entirely from this dump. The sulphur flotation plant, which was designed by Raúl Carrasco, has a capacity of 220 tons per day. The only other one known is a smaller copy installed recently at Buenaventura.

The Aucanquilcha plant was put in operation in 1947 and has proven very successful. The "ripio" is screened to minus-3/16-inch; oversize is rejected and undersize is floated without crushing. The six No. 18 Special Denver Sub-A (Fahnenwald) cells are made entirely of

aluminum except for the impeller, which is cast iron. Kerosene is added to the feed, impregnating only the sulphur particles. These rise and the waste sinks, and pine oil is added to form a surface froth to hold the sulphur in the overflow, which is an 85 percent product. This is returned to the autoclaves for refining.

### Outlook

During World War II, production of refined sulphur was about 1,600 tons per month. It later fell to less than half that, due to lessening demand. The international market was dominated by cheap Frasch process sulphur from the Gulf Coast, selling at about \$20 per ton, and Aucanquilcha sulphur was sold at about \$40 per ton behind protective tariffs in Chile, with some exports to Brazil. The recent shortage of Frasch process sulphur, however, coupled with increasing demand, has raised the price of sulphur in Chile to over \$50 per ton and boomed mining.

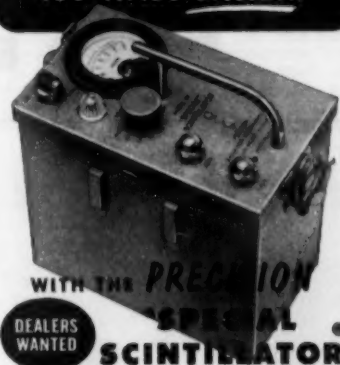
So far, literally, only the surface has been scratched in the Andes Sulphur Belt. At the present production rate sulphur should be there for at least 10,000 more years! Chile's production of refined sulfur had increased in 1951 to 24,000 tons from the post-war low of 7,722 tons in 1949. Bolivia, Peru, Ecuador, and Colombia together only produce a few thousand tons a year, but Argentina's production now competes with Chile's.

The capitalization of the Sociedad Azufrera Aucanquilcha is 60,000,000 pesos. As well as maintaining operations office in Antofagasto, the company has its main office in Santiago. With sufficient additional capital to enlarge and better mechanize the operation, its sulphur might compete in international markets, such as Argentina. The grade, size, and accessibility of the Aucanquilcha deposits certainly appear to justify consideration of a larger-scale, cheaper operation.

### Cooperation Appreciated

I am much indebted to Senor Carrasco for his hospitality during my visit to the mine in October 1949, for supplying photographs and much information for this article, for his criticisms of it, and for permission to publish it. I am grateful also to the many mining men in Chile, Peru, and Bolivia who contributed information on other mines mentioned herein.

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# PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.



## Costly Air Compressors Eliminated By New Drill

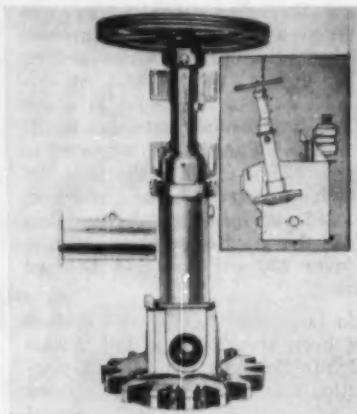
The Homelite Corporation of Port Chester, New York, announces the introduction of the new Bosch electric rock drill. Said to eliminate the need for big, costly-to-maintain air compressors, this versatile drill is powered by a light-weight, rugged, high cycle motor requiring no brushes. It is operated from an easily carryable Homelite generator weighing only 130 pounds. The rock drill, equipped with the Bosch pressure blower, drills blasting holes, wedge holes, split holes and anchor holes in the toughest rock, concrete or brickwork. The manufacturer says that this trouble free tool will drill holes 18-feet deep, and operates with a minimum of noise. For further information circle No. 43.



## Caterpillar Tractor Co. Introduces 150 HP D8 Cat

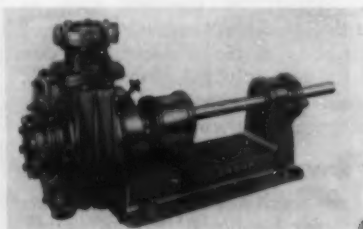
Marking its fiftieth year of manufacturing track-type tractors, Caterpillar Tractor Co. has announced a new 150 horsepower D8 Tractor. Incorporating increased horsepower, weight, and engineering advancements which contribute to increased production at lower operating cost, the new D8 is the latest de-

velopment in the crawler field. A Caterpillar-built Diesel engine with an output of 185 horsepower operating at a governed speed of 1200 revolutions per minute powers the new D8. To obtain full information, circle No. 65.



## Down Time Reduced on Denver "Sub-A" Cell

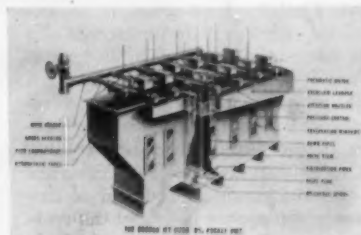
A new suspended unit shaft assembly designed to reduce down time for maintenance is announced by Denver Equipment Co. Assembled as one unit, the shaft assembly is suspended in the tank by four bolts. Removal of the four bolts allows the mechanism to be lifted from the cell. Removal and replacement can be made in less than ten minutes. Parts for the new shaft assembly are interchangeable with parts for older models. A removable feed pipe enables the assembly to be adapted for either standard cell-to-cell or free-flow of pulp operation. Circle No. 74.



## Sand Pump Features Easy Removal of Impeller

The new Krogh model 600 sand and tailing pumps are specially built for a rough class of heavy duty pumping. An important feature of the model 600 is that the impeller and all liners can be readily removed from the shell, or casing, and reinstalled without dismantling

the drive end of the pump, and without disconnecting the discharge pipe. This can be accomplished by simply unscrewing the impeller from the shaft. A simple wear take-up adjustment restores proper clearance between rotating impeller and stationary nozzle. Circle No. 49 for descriptive material.



## Unusual Design Features New Dorr Hydraulic Sizer

The Dorr Company announces the availability of the Dorrco Jet Sizer, a new hindered settling hydraulic classifier, for the sizing and grading of solids 8-mesh and finer. It will produce, on a continuous and completely automatic basis, any desired number of sharply sized fractions from feed having a wide particle size distribution. It is reported that the Jet Sizer permits more effective use of hydraulic water to produce clean, deslimed fractions sized within narrow limits.

Water under hydraulic pressure is distributed from an elevated header through a system of vertical pipes to four horizontal pipes along the bottom of each compartment. Minus 8-mesh feed pulp is introduced to the first compartment in which the coarsest particles are scalped out. Finer material overflows a submerged weir to the second compartment which operates at a slightly reduced water velocity. Similarly each compartment yields a graded product. For further information circle No. 53.

## Insert Bits Engineered For Drilling Variations

Manchester insert bits are engineered to suit your drilling conditions. You can specify the carbide you prefer—WEAR-EVER for maximum gage control or TOUGHITE for maximum shock resistance. Over 4 years of intensive open stope drilling research went into the development of the Manchester bits. Four series of bits are available; jackhammer, stoping, heavy drifter and wagon drill, and the large bit series. Holding thread wear to a minimum is a Manchester specialty.

Detailed information on the complete line of insert bits, including prices, is available and Manchester Bit Corp. will gladly send you this information if you circle No. 37.

MINING WORLD



**SAVE TIME, MONEY** with new low cost voice communication for deep shaft mines. The Farmers Engineering and Manufacturing Company's Caphone uses carrier current through the hoist rope. For more information circle No. 1.

**ORIENTED DIAMOND BITS** cut faster, last longer according to Sprague and Henwood Inc. Each diamond is set with its hardest rib toward the work. Circle No. 2 for more information.

**SELF BAKING ELECTRODE GEAR:** A self baking electrode made by the Lectromelt Furnace Corporation requires no moving parts at the electrode clamp level. Circle No. 3.

**NEW pH METER:** A new pH meter made by Beckman Instruments Inc. is one quarter the size of conventional units. It is said that moisture-proof construction saves maintenance costs. Circle No. 4 for more information.

**MANGANESE STEEL PARTS** are the subject of descriptive bulletins published by the Taylor-Wharton Iron and Steel Company. Circle No. 55 for your copy.

**CYCLONE THICKENERS** are discussed in a booklet prepared by Heyl and Patterson, Inc. Get your copy by circling No. 6.

**LATEST REAGENT BULLETIN:** This bulletin on properties and applications of various American Cyanamid Company's chemicals and flotation reagents may be obtained by circling No. 56.

**PROSPECTING FOR URANIUM** from a moving vehicle, on foot, or by aerial survey may be done with the PRI scintillator according to the Radiac Company. This portable battery operated instrument is said to be 100 times as sensitive as the most sensitive geiger counter. For more information circle No. 8.

**ORE DRESSING PROBLEM?** The Fraser & Chalmers Engineering Works, Erith, Kent England maintains complete facilities for carrying out mineral dressing investigations through the General Electric Company Ltd. Circle No. 9 for your copy of a descriptive bulletin covering facilities offered.

**VERSATILE DRILL:** The Ingersoll-Rand Company describes the new QM-2 Quarry-master in a 15 page bulletin. The manufacturer claims this is the only machine of its kind developed as a dual purpose blast hole drill for either rotary or percussion drilling. This portable unit offers maximum drilling efficiency for changing ground conditions. Conversion from per-

cussion to rotary drilling is made by substituting one type of drill for the other on the tower. Circle No. 10.

**PLUG VALVE ACTUATORS:** An 8 page bulletin on plug valve actuators has been prepared by the Ledeen Manufacturing Company of Los Angeles. Tandem type actuators and floating type actuators are described. An actuator selection table, typical applications, dimensions, and various mountings are shown. Circle No. 11 for more information.

**HARDFACING PROBLEMS?** Mangakote, a new, fast many purpose welding electrode containing 11 1/2 to 13 percent manganese-nickel steel has been developed by Resisto-Loy Corporation. Advantages claimed for this new all position rod for welding at high speed are that it eliminates all the special techniques of application required in welding manganese steel, and requires no peening. For more information circle No. 12.

**URANIUM BOOKLET:** Minerals Engineering Company and Junction Bit & Tool Company have released a new booklet "Working Tools For Prospecting and Developing Uranium and Other Ores." Circle No. 13 for your free copy.

**BETA SCINTILLATION COUNTER:** A new, light-tight scintillation counter that counts beta particles, but is relatively insensitive to gamma rays and neutrons is announced by National Radiac, Inc. of Newark, New Jersey. For more information circle No. 14.

**GREATER ADVANCE PER BLAST** is claimed for rounds drilled with an 8-inch diameter burn cut. The Ka-Mo Tools, Inc. of Cicero, Illinois manufactures a rotary drill specially designed for underground hard rock mining, and capable of drilling an 8-inch hole at high speed. Circle No. 15.

**NEW FILTER CLOTH:** Polyethylene filter cloth, developed by Sanger-Funnel Inc., 60 East 42nd Street, New York, N. Y., is said to offer excellent chemical resistance to the action of most acids, the common alkalis, certain organic solvents and oxidizing agents, most aqueous salt solutions, and mineral and vegetable oils. A heat stabilized form of polyethylene fabrics minimizes shrinkage from temperature effect up to 212° F. For more information circle No. 20.

**MOTOR SCRAPERS:** Mechanical and performance features of the Allis-Chalmers Models TS-200 and TS-300 Motor Scrapers, and of Motor Wagon models TR-200 and TW-300, are described in de-

tail in two new catalogs now available, MS-452 and MS-453. Important mechanical and operating features are covered. For your copy circle No. 21.

**AUTOMATIC SAMPLE CUTTERS:** How a simple water spray prevents the buildup of solids on automatic sample cutters is told in an operating note that has just been published by Denver Equipment Co. The article also describes a method of eliminating difficulties encountered by clogging and splash contamination of sample launders. For your copy circle No. 22.

**REVOLUTION IN SINTERING:** Increased sinter production, lowered cost, a more uniform product—these are the results of using the Rowen windbox seal on the new Dwight-Lloyd sintering machines. The seal completely eliminates air leakage between pallets and windbox. With it the sinter at the edge of the pallets gets the same amount of air as the sinter in the center, greatly improving the uniformity of product. Production is also increased as the burning is more efficient and the operation is, therefore, faster. Operating costs are lowered because less air is needed to do the job and because the amount of return sinter is reduced. For more detailed information circle No. 36.

**NEED HEAVY DUTY CONVEYORS?** A new super strength conveyor belt, called Super Ustex-Nylon, has been introduced by the United States Rubber Company. The belt utilizes a new type of cellulosic yarn which is chemically treated to give it exceptional strength. Advantages claimed are: it is 3 times stronger than the strongest rayon belt fabric, and 3 1/2 times stronger than the strongest cotton duck used in belts today. The only belt carcass in its strength range is steel cord; unlike steel cord, however, it cannot rust or corrode. Circle No. 23.

**EARTHMOVERS:** Are you seeking a highly maneuverable medium size rubber tired tractor, capable of keeping pace with the larger size units? A folder published by Caterpillar Tractor Co., features the new 150 h.p. Cat DW 15 tractor. The folder (form 31041) is complete with photographs and cutaways of the engine, transmission and clutch, and a detailed specification sheet. Obtain your copy by circling No. 24.

**MINING TOOL CATALOG:** The Carboly Department of General Electric Company has published a catalog which includes its full line of standard stocked cemented carbide mining tools. Complete information, including design specifica-

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tions, is given on cutter bits, finger bits, auger drills, and roof bolting drills in catalog CM-120. Circle No. 25 for your copy.

**CUT MAINTENANCE COSTS:** Torque converters meeting the requirements of heavy-duty operation now are available for application in the lower power ranges, through the development of a new series of Allison Torqmatic Drives. The new converters can be used with either gasoline or Diesel engines in the 40 to 150 horsepower range. They have a wide range of applications covering road rollers, cranes, shovels, end loaders, tractors and ditchers. For more information circle No. 26.

**INDUSTRIAL HOSE:** The new hose designed for general industrial use has been developed by the Republic Rubber Division, Lee Rubber Tire Corp. Named Conductall, the new hose may be used to conduct air, oxygen, acetylene, water, oil, grease, gasoline, kerosene and many dilute chemical and acid solutions. Get details by circling No. 57.

**JAW CRUSHERS:** The Pioneer Engineering Works, Inc. has prepared a new booklet, No. 649, describing new developments and improved features of design to increase efficiency and reduce the operating costs of overhead eccentric jaw crushers. Principles of design, construction features and parts, operation and application are discussed. Also covered in detail are suggestions on how to select the proper size crusher. Circle No. 30.

**NEW SHOVEL:** Osgood-General of Marion, Ohio announces a new combination shovel, dragline, clamshell, crane, hoe and piledriver is now available. Specification No. 5421 describes this versatile unit. Changes can be made in the field. For more information circle No. 58.

**WIRE ROPE RECOMMENDATIONS** and Catalog is the subject covered in a descriptive bulletin prepared by the John A. Rosbling's Sons Corporation. The catalog is divided into 16 sections, one for each of the major industries which use wire rope. Each section, clearly marked by index tabs for quick reference, gives detailed information on wire rope for specific requirements. Wire rope users everywhere should find this catalog useful in selecting rope for specific jobs. Circle No. 32.

**SIX-WHEEL HEAVY-DUTY TRUCKS:** A revised 24-page catalog describing the performance features and specifications of the Standard, Loadstar and Roadliner

models of International 6-wheel heavy-duty trucks is available from the International Harvester Export Co. This full color catalog is amply illustrated with photographs and drawings of these new International R-line models powered by gasoline, LPG, or diesel engines. Circle No. 27.

**CONCENTRATING TABLES:** Bulletin No. T1-B3, is a new bulletin published by Denver Equipment Co. to explain how tables are used to treat materials subject to gravity concentration. Data describing several models include specifications and facts about the capacity and operation as well as their application in the flowsheet. Table construction is described in detail. For your copy circle No. 28.

**TUNGSTEN OPERATORS!** A revised brochure on the beneficiation of tungsten ores has been released by the Mineral Dressing Department of the American Cyanamid Co. The new brochure describes various methods of processing tungsten ores, particularly the froth flotation processes used on Western United States ores. To get your copy circle No. 7.

**SELF-OPERATED FLOW REGULATOR:** A new self-contained flow-regulating device for clean gas-free liquids is described and illustrated in Fischer & Porter Co.'s Catalog No. 10-F-70. A constant flow rate is maintained by means of energy derived from the flow stream itself, without external power supply. The regulator is unaffected by position and may be equipped with a diaphragm motor valve for remote setting of control point. To get your copy circle No. 29.

**NEW "PAYLOADER" MODELS:** The Frank G. Hough Co. has recently announced the introduction of new models of the "HA" and "HAH" front-end shovel-loaders with torque-converter-drive as standard equipment. In addition, the "HAH" model is equipped with power steering. Full information on these new models may be had by circling No. 33.

**P&H, IMPROVED DIESELS:** Announcement has been made that the P&H Diesel Engine Div. of the Harnischfeger Corp. is now in production with a complete improved line of 2-cycle Diesel engines featuring 36 percent greater power output. While of the same basic design as the former models, the new higher performance engines carry 52 major advancements and refinements. The new Diesel engines feature even greater simplicity of design and construction, and are rated by the manufacturer as the most powerful,

for their size and weight, built today. For complete information circle No. 34.

**IMPROVED ALLOY WELDING** for building-up and hard-facing all types of manganese parts such as shovel buckets, crusher rolls, and the like is explained in a brochure put out by the Stoodly Co. of Whittier, Calif. To get your copy circle No. 5.

**PUMP FUNDAMENTALS:** Ingersoll-Rand has available for distribution an interesting and instructive booklet on "Centrifugal Pump Fundamentals." This 12-page form is written in simple language and illustrated with easily understood diagrams. It should be useful to all pump operators and installation and maintenance men as it explains the principles of operation, defines the various terms used in pump calculations, and works out typical pump problems. To get your personal copy circle No. 31.

**TWO NEW EUCLID CATALOGS:** Two new 8-page catalogs covering the Euclid 17-Yard Bottom-Dumps and the Euclid Twin-Power Scrapers manufactured by the Euclid Div., General Motors Corp. are now available. Brief specifications and typical performance figures are included as well as individual design features. For your copies circle No. 38.

**LEAD-ZINC FLOWSHEET:** Flotation of a highly complex lead-zinc ore at Kootenay Base Metals, Ltd., is described in Denver Equipment Co.'s new Engineering Notebook bulletin No. M4-B70. Details of mill construction are shown together with construction and equipment costs. In addition to a detailed explanation of the flowsheet, the bulletin describes the geology, mining methods and ore transport, power, water supply and mill construction and design. You may have a copy by circling No. 39.

**DIESEL POWER UNITS:** An illustrated specification folder on UD-350 Diesel 78.5 B.H.P. Engines and 75 B.H.P. Power Units is available from the International Harvester Export Co. In addition to engine and power unit specifications, this eight page folder also includes UD-350 performance ratings for units with 1800 R.P.M. governed speed, and complete lists of power unit components and attachments. Circle No. 40.

**AIR FOR YOUR ENGINE** is the subject covered by bulletin No. 16 prepared by the Cummins Engine Company, Inc. In the interest of better maintenance, engine owners everywhere should find this material useful. Circle No. 19.

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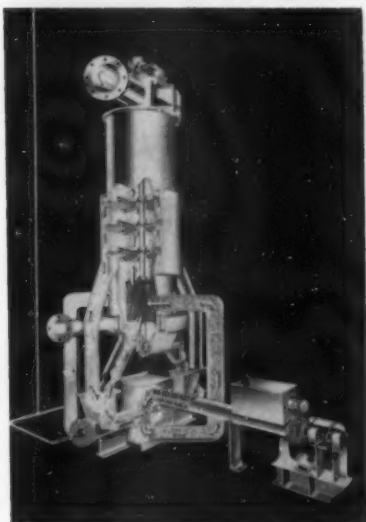
MINING WORLD—WORLD MINING

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### Foreign Particles Removed In Improved Pulverizer

An improvement in the design of its Jet pulverizing machines has been announced by the manufacturer, Majac, Inc., Sharpsburg, Pa. The new design incorporates a "rock stripper" phase which removes foreign particles of high specific gravity immediately after material to be pulverized is introduced into the machine. By eliminating this foreign material quickly, the entire pulverizing process is accelerated. Majac Jet pulverizers function by creating head-on collisions of materials against themselves under high velocity, attained by injecting materials through opposing guns by means of high pressure gas jets. It is said that precise control of fineness is obtained, as well as exact particle size distribution. Circle No. 50 for more information on the pulverizer.



### Page Offers New Medium Weight Bucket

Page Engineering Co., Chicago, Ill., has announced the addition of a new medium weight bucket,  $\frac{1}{2}$  to 3 cubic yards in capacity, to its line of automatic dragline buckets. Designated the RM Class, these buckets will dig sand and loose gravel as well as dirt, clay or any material free of stumps and boulders. The RM's new knife-edged lip and replaceable teeth are cast of high manganese steel to withstand shock and abrasion. For further information circle No. 66.

AUGUST 1954

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### Hemispheric Minerals

(Continued from page 50)

could be used as a basis for a new survey. Such a survey project, which is now being considered by a private foundation, could be carried out by a few competent consulting engineers working in full accord with the local mining engineers, metallurgists and the Government officials. It would result in pointing out ways to technical improvements that would speed up production and expand exports thus helping the economy and social progress within the countries to be surveyed.

### Legislative Adjustments

Together with the mineral survey, attention would be given to the mining codes and legislative adjustments recommended to encourage private investment in each of the important mineral producing countries in Latin America. It should also demonstrate how capital could be employed to best advantage in co-operation with local capital and how jobs could be created to meet the labor situation and the yearly increment of young mine workers.

In general it is felt that private financing should take the lead in developing mining enterprises abroad and that encouragement be given to venture capital by adjustments in taxes, tariffs, and exchange controls in the Latin American Republics and the United States.

### The Importance of Cooperation

Self sufficiency in raw-mineral products within the Western Hemisphere and reduced dependency upon sources in the Eastern Hemisphere can best be attained if the Latin American and United States governments cooperate more fully in the field of technical and scientific research as well as in trade looking toward the greater use of raw mineral products within the Western Hemisphere. The accompanying table shows the importance of Western Hemisphere minerals.

### The Inter-American Conference

As the mineral industries are essential to the development and economy within the Americas let us hope that these above mentioned economic problems pertaining to ways to increase mineral production and trade in minerals and metals through private enterprise may come up for discussion and solution at the next Inter-American Economic Conference scheduled at Rio de Janeiro, Brazil this fall.

AUGUST 1954

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Beckman — pioneer of virtually every major advancement in pH equipment — now presents a significant new development in industrial pH instruments — the new Model W Industrial pH Meter.

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### Largest Titanium Plant Scheduled for Ohio Site

A \$30,000,000 titanium sponge plant will be built by Electro Metallurgical Company, a division of Union Carbide and Carbon Corporation, at Ashtabula, Ohio. With a 10,000-ton annual capacity, it will be the world's largest plant for this purpose.

The company will use its own sodium reduction process in the production of the metal. A contract with the General Services Administration is expected to be completed soon. The GSA now has a total production program of 23,000 tons of titanium sponge, and is anxious to expand the supply of this strategic metal. Minimum Air Force requirements are currently set at 10,000 tons of titanium.

### Hanna Ships First Iron Ore From Morton Pit

After more than four years of stripping, the first ore was loaded at the Morton mine on June 25. The Morton is operated by the Morton Ore Company, The M. A. Hanna Company, agents.

A combination crushing, screening, and washing plant was erected this year and is now in production. Two 30-ton capacity skips, operated in balance on an inclined skipway, take the ore from the pit to the plant.

Approximately 20,000,000 cubic yards of overburden have been removed since stripping operations began in January 1950. Most of the overburden was handled by a 30-cubic-yard-capacity drag line and conveyor belts.

Stripping operations with the dragline and conveyors will continue because there is still a substantial amount of overburden to be removed.



Magnet Cove Barium Corporation has installed two new ore crushing units in its barite plant at Malvern, Arkansas. The new equipment permits the crushing of large boulders of ore which could not be crushed in the past. Included in the new equipment are a 30-inch by 42-inch Telsmith jaw crusher, a 5½-foot Symons shorthread cone crusher, a 48 Wemco dewatering screw, and two 60-inch electromagnets to remove scrap iron from the barite ore. The ore comes from the company's mine at Magnet Cove. The entire changeover was made without shutting down the plant.

A small crew of workmen are removing underground equipment from the mines of Rosiclare Lead and Fluorspar Mining Company in Hardin County, Illinois. The firm is allowing the mine to fill with water to about the 220-foot elevation below the shaft collar in order to save pumping expenses while the mine is inoperative. When and if fluorspar market conditions improve, the company will consider dewatering the mine.

The Arkansas Mining and Exploration Company has enlarged its slime pond

and constructed a larger dam. The firm conducts manganese mining operations near Batesville, Arkansas.

The Wenner-Gren Foundation for Anthropological Research of New York has granted \$3,000 to the Michigan College of Mining and Technology at Houghton, Michigan for research on the prehistoric copper miners and their operations on the Keweenaw Peninsula and on Isle Royale. The survey will be under the direction of Dr. Roy Ward Drier, professor of metallurgical engineering at Michigan Tech.



New Jersey Zinc Company engineers have decided that the most economical method for transporting zinc ore from the *Ivanhoe* mine to the Austinville, Virginia mill, distance of about 2½ miles, is underground through a 13,325-foot tunnel. Work has already started on the project and more than 1,000 feet have been driven from the Austinville side and about 300 feet from the *Ivanhoe* side. Dimensions of the tunnel are 8 feet by 10 feet. Ten-ton Diesel locomotives and 80-cubic-foot cars will haul the ore to the crushing station below the tunnel level in the Austinville. From there it will be hoisted to the surface for milling.

The Tungsten Mining Corporation is constructing a new chemical plant at its *Hamme tungsten* mine near Henderson, North Carolina, and expects it to be in operation early in 1955. The plant is estimated to cost between \$150,000 and \$200,000 and should save approximately \$8.00 to \$10.00 per unit or about \$140,000 to \$180,000 per year over previous costs of treating secondary material under outside contract. For the first nine months of this year, production for the firm was 104,100 units, compared with 82,555 units during the same period of 1953. This is an increase of about 26 percent.

Inland Steel Company has closed the last of its fluorspar operations—the *Key-stone* mine near Marion, Kentucky. Most of the equipment, machinery, and supplies are being shipped to other Inland Steel operations.

Tennessee Copper Company has installed a new tri-cone mill in its operation at the *Isabella* mill to increase production. The unit is now in operation with the mill grinding about 1,500 tons of ore every 24 hours.

The Virginia Ore Company has been organized to locate and to mine manganese and manganese-bearing ore in Virginia. Its officers are: Arthur Fleischman of Riverdale, New York, president; Paul Fleischman of New York City, treasurer; and Ezra Ziekha of New York City, secretary.

The General Services Administration has agreed to pay part of the cost of testing a new process for producing com-



Photo by Durant Barclay, Jr.

### Reserve Proceeds with Plant Construction

Construction of Reserve Mining Company's big new taconite plant at Silver Bay, Minnesota is well under way as illustrated by the photograph above. The flow of operations will start in the lower right-hand corner where four storage bins will receive the ore delivered from the mine by railroad cars. To the left of the bins is the foundation for the secondary crushing plant where ore will be crushed to mill feed size. A conveyor belt running through a tunnel under the highway will transport the feed to main concentrator storage bins in the center of the picture. Directly behind this is the foundation for the main concentrator. Near the upper right-hand corner of the photograph are the warehouse and maintenance facilities. Between this area and the concentrator, the agglomerating plant is located. The concrete batch plant used during construction is at the lower left, while near the water is the structural steel frame for the power house. The dock cells visible along the water represent about one-half of the eventual dock length. A drill boat is currently drilling and blasting the rock ledge along the proposed dock area.

mercial titanium. *Horizon Titanium Corporation* of Princeton, New Jersey will build a pilot plant and will run test operations for one year. Tentative location of the plant is at Stamford, Connecticut. The government has limited its contribution to \$564,300. If experiments prove successful and the process is used on a commercial scale, the contract provides for return of the government's money.

*Mallory-Sharon Titanium Corporation* of Niles, Ohio has been granted a five-year rapid tax write-off covering 90 percent of \$3,986,614 to construct titanium ingot production facilities. Government authorities have also authorized producers of titanium mill products to release 10 percent of their monthly output to civilian and industrial users. Until now, titanium had been used almost exclusively by defense industries. In releasing material for non-defense, the government hopes to encourage manufacturers of titanium sheet, bar, rod and other shapes and forms to "explore industrial markets with some assurance of making delivery of titanium mill products." A new order designated M-107 provides that no producer of titanium mill products will be required to accept defense orders calling for delivery of more than 90 percent of his scheduled output in any one month. But the producers will not be allowed to cancel or postpone defense orders already accepted, even if deliveries against these orders would require more than 90 percent of their monthly output.

Domestic consumption of beryl in 1953 was less than one-third of the total supply available last year, reports the Department of the Interior. Last year's new supply of beryl was nearly 9,000 tons, the largest in history, and domestic consumption amounted to only 2,662 tons. The United States imports about 90 percent of its beryl. Last year domestic mine shipments were about 750 tons while imports exceeded 8,200 tons. Commercial-grade beryl contains generally from 3.6 to 4.5 percent beryllium.

The Office of Defense Mobilization reports that expansion projects for nickel coming into production this year and next will add 40,000 short tons to the nation's annual supply by 1956. However, the total supply will still be insufficient for both industrial and stockpile needs during the next few years. Molybdenum output for this year may reach 65,000,000 to 70,000,000 pounds, compared with 28,000,000 pounds in 1950. United States cobalt output, plus imports, will top 20,000,000 pounds this year, more than double the 1950 supply.

*Lithium Corporation of America* has arranged for a \$7,000,000 loan to erect a new plant at Bessemer City, North Carolina for the expansion production of lithium products. Financed by private sources, the loan will be amortized over a five-year period, with the company able to liquidate the loan during that time by sales contracts. Ground has already been broken, and the plant is expected to go into operation in December.

Ore deposits drilled and proven in North Carolina assure a 20-year supply for the new plant. An eight-year supply of ore reserves from the company's mines in Black Hills, South Dakota are immediately available for the operation of the plant at St. Louis Park, Minnesota and additional reserves in the Cat Lake area of Manitoba and Lake LaMotte region of Quebec extend the company's spodumene (lithium-bearing rock) reserves by an appreciable margin.

Because of the increasing importance of mathematical methods in the field of mining engineering, *Mathematical Computing Service* has been organized to devote itself exclusively to applied mathematics. The group specializes in performing services for industries desiring engineering calculations, charts, and nomographs of a high degree of complexity. An important function is the mathematical formulation and complete solution of a problem from given physical data. The staff consists of consultants holding doctorate degrees who are qualified to treat problems in applied mathematics related to the physical sciences. Offices are in Brooklyn, New York.



June ore shipments on the Great Lakes were the best for any month this season, although still below the tonnage of last year. June shipments this year totaled 10,608,262 tons, compared with 13,744,984 in June of 1953, a decline of 3,136,632 tons. The season's total through June is 22,084,520 tons, or almost 14,000,000 tons below the 36,058,371 tons for the same period of last year.

The *Mahoning* mine, operated by *Pickands Mather & Co.* at Hibbing, Minnesota, has been named the safest open-pit mine in the United States. The "Sentinels of Safety" trophy has been awarded for 773,666 man hours of operation during 1953 without a lost time or disabling accident. The accident-free period at the Mahoning has actually continued for 27 months with a total of 1,570,566 man hours worked without a lost time accident. E. J. Fearing is general superintendent; W. D. Webb, superintendent of mine operations.

The *Chicago & North Western Railway* has ordered Diesel locomotives of greater horsepower to replace those now in use in hauling ore from the Marquette and Menominee Ranges.

The *North Range Mining Company* reopened its *Book* mine near Alpha, Michigan after being closed for three months. The company recalled 70 men to work a four-day week. Offsetting this was the suspension of work and laying off of 73 men at the *Lawrence* mine of *Pickands Mather & Co.* This was a high phosphorus ore mine for which there is currently no demand.

*Cleveland-Cliffs Iron Company* has cut its working forces at five of its iron mines on the Marquette Range, Michigan. About 500 workers will be affected. The cutback is reported to be caused by curtailed operations of the steel industry.



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## Rico Argentine to Build Acid Plant in Colorado

Rico Argentine Mining Company has announced that it will build a large sulphuric acid plant at its mines at Rico, Colorado. The plant is expected to supply a boost to the uranium mining industry in the intermountain area by providing sulphuric acid for uranium mills on the Colorado Plateau. It will cost an estimated \$1,500,000.

An output of 200 tons per day is planned with completion set for late summer of 1955. Uranium mills within a radius of approximately 100 miles of Rico will be served by the plant. Present plans call for trucks to transport the acid to the mills. Sherman Hinckley, president and general manager of Rico Argentine, said that the site is ideal, not only for its central location, but because the necessary pyrite, power, and water are immediately available.

Rico Argentine, a leading Colorado lead and zinc producer, has stock piled more than 200,000 tons of pyrite, from which sulphuric acid is made, as a by-product of its lead-zinc milling operation. In addition 15,000,000 tons of pyrite are available by mining. The tailing will constitute the immediate raw material supply for the acid product.

## AIME Minerals Conference Set for October 28-30

October 28 through 30 are the dates of the Rocky Mountain region's Industrial Minerals Conference which will be held in Salt Lake City, Utah under the sponsorship of the American Institute of Mining and Metallurgical Engineers, Utah Section.

Included in the papers to be read at the technical sessions are "Open-Pit phosphate Mining Operations," by Charles W. Sweetwood, mine superintendent for the J. R. Simplot Company, Boise, Idaho; "The Production of Elemental Phosphorus via the Electrical Furnace Route," by J. L. Whiteside, plant manager for Monsanto Chemical Company, Soda Springs, Idaho; and "Chemical Treatment of Ores," by C. A. Romano, resident manager of Intermountain Chemical Company, Green River, Wyoming.

The meeting will also play host to J. Bracken Lee, governor of Utah, who will address the group at the opening luncheon on Friday, October 29.

## 118 Uranium Claims Sold In Fremont Co., Wyoming

Three groups of claims were sold in Fremont County, Wyoming late in June to two groups with down payments reportedly in excess of \$50,000. All the claims are in the Gas Hills district in eastern Fremont County and are not far distant from the scene of the initial central Wyoming uranium discoveries (see MINING WORLD map, page 97, December 1953, for general location of the claims.)

All claims are located about five miles southwest of the original discovery and about two miles southeast of Puddle Springs where the U. S. Atomic Energy Commission has established field headquarters.

The 29 claims in the Bart, Hal, Eagle, and Skoal groups were sold to Sam Day of Fort Collins, Colorado, according to Dr. L. F. Bartels of Lander, one of the principal owners. These claims were staked last October. The 68 claims of the Wild Cat Company were also acquired by Mr. Day from a group of Lander school teachers who staked the claims early in November last year.

The 21 MBH claim group was purchased by Cotter Ferguson and Carroll Payne of Laramie, Wyoming.

## Student Mining Program Begun by Colorado Firm

A program designed to revive interest in professional mining engineering among American high school students has been launched by the Colorado Mining Corporation, New York City. The "Mining Engineering for American Youth" project consists of selecting a high school youth with no previous interest in mining and sending him to the company's Colorado claim for a four-week stay, with the possibility of a future scholarship from the firm.

The program is aimed at students who have not yet decided on mining engineering for a career, and the company plans to publicize this summer's program by means of progress reports and talks by the student chosen when he returns to his home. The four-week project includes room and board, a \$50 a week salary, supplies, and the proceeds from whatever ore he is able to haul from the mine's "dump." The student will learn about copper and molybdenum mining

at Hahn's Peak, site of the company's Colorado properties, at the nearby Mount Harris coal mine.



Increased uranium claim filing was reported in Delta, La Plata, and Mesa counties of Colorado during June. Many "weekend prospectors" were evident in Delta County, resulting in a flood of more than 500 claims being filed in the county clerk's office from February until June. In La Plata county a reported 75 claims were filed during the first week of June, bringing the total for recent months to 175. A record 273 location claims were filed in one day in the Mesa County clerk's office in Grand Junction. Interest in the county centered around the Gateway and Loma-Mack mining districts.

It is reported that *Shenandoah-Dives Mining Company's* lead-zinc operations at Silverton, Colorado have been temporarily suspended. At the time of closing the company was still conducting a joint-DMEA exploratory program which had begun last July. Only a few men will be retained as watchmen at the mine until domestic mining conditions justify a continued and expanded program, according to company spokesmen.

A. J. Slagter Producing Company has opened new offices in Grand Junction,



## Blasting Overburden in Wyoming Phosphate Pit

Blasting of overburden at the open-pit phosphate mine of San Francisco Chemical Company at Ledge, Wyoming, is shown above. About 42,000 pounds of dynamite were used for this particular area which measured approximately 1,000 feet long by 140 feet wide. The powder was placed in 72 holes with an average depth of 52 feet to break about 180,000 tons of chert. It was the largest blast undertaken by San Francisco Chemical and cost about \$11,000. About one month will be required to strip the overburden and remove the ore. About 50 per cent of the overburden at this Wyoming operation can be stripped without blasting. The picture was taken by D. L. King, president and general manager of the firm. The company also has extensive operations near Montpelier, Idaho, and in the Crawford Mountains of Rich County, Utah.



Colorado. Arch Boyd, formerly with Minerals Engineering Company, has replaced William Barbree as manager of the Uranium Operations division of the firm.

A new mining company, the *Argyle Mining and Milling Corporation*, has been organized in San Juan County, Colorado. Its operations will include management of the *Silver Bay Mines*, including the *Blackhawk* mine and the *Pride* mill. President of the new firm is J. Cameron Grant.

The *Dow Chemical Company* of Midland, Michigan, has bought 7,600 acres of oil shale land on Colorado's western slope, 50 miles east of Grand Junction. Although Dow has no immediate mining plans for the property, it will be kept as a reserve source of petrochemicals, ethylene, methane, propane, and butane. The firm acquired the property through purchase of 85 percent of the stock of the *Columbia Oil Shale Refining Company*, a Colorado corporation, for \$1,500,000.

Geological mapping of the Telluride, Colorado area has been begun by a four-man crew from the United States Geological Survey. A long-term project expected to take several years, the mapping will include structures throughout the area believed to contain deposits of lead, zinc, gold, silver, vanadium, and uranium. Approximately 300 square miles will be covered by the project, which is under the direction of A. L. Bush.

## UTAH

Utah's uranium boom spread to Millard County in the central part of the state during June after a uranium deposit was reported at the mouth of Meadow Creek Canyon about eight miles south of Fillmore. An estimated 150 persons were turned away from the county recorder's office at the end of one day in which another 150 prospectors filed claims. The strike was centered in a four-mile square area, and an official of the United States Atomic Energy Commission confirmed evidence of uranium there.

*Potash Chemical Company*, a Utah corporation, has begun drilling for carnallite-sylvite deposits south of Greentown, Grand County, Utah. Contractor for the diamond-core exploration program is *Joy Manufacturing Company*. The firm has from 15,000 to 20,000 acres under potash lease from the federal government in this area.

Companies recently entering the Utah uranium picture include *Inspiration Lead Company* of Spokane, Washington, which has taken over eight claims in San Juan County; *National Uranium Corporation*, Idaho firm, which is concluding negotiations for leases on property near Coyote Wash south of the La Sal Mountains in San Juan County, and *Penn-Texas Corporation*, formerly *Pennsylvania Coal and Coke Corporation*, which has announced formation of *Penn-Uranium Corporation* as an affiliate and is completing acquisition of 100 claims in

the Big Indian District of San Juan County.

*Amill Silver-Lead Mines, Ltd.*, with headquarters in Vancouver, Washington, has started uranium production west of Moab, Utah, through its subsidiary, *Amex Uranium Mines*. A crew removing a hilltop for a compressor site uncovered a two-foot band of ore of much better grade than ore being drifted upon.

A 30-day control option extension, beginning June 25, was granted a group including W. L. Davidson, Albuquerque, New Mexico, and Floyd B. Odium, *Atlas Corporation* president, by the *Federal Uranium Corporation* in Salt Lake City, Utah. Under the proposed plan, which must be approved by Federal stockholders, the Davidson group would exchange southeastern Utah uranium properties and an undisclosed sum of money for Federal stock. The transaction involves 87 claims along the Lisbon fault in San Juan County. Mr. Odium also has control of uranium properties in eastern Utah through the *Lisbon Uranium Corporation*.

*J. R. Simplot Company* of Pocatello, Idaho, expects to begin phosphate ore shipments from the Crawford Mountains in Utah soon. One shift per day is being worked at the operation and a new 2½-yard shovel was recently purchased to mine the rock.

*Moreno Uranium Corporation* has commissioned the *Geo Engineering Company* of Grand Junction, Colorado to conduct an exploratory and production program on *Moreno's School Section No. 32* in the LaSalle Creek area of Utah, adjoining the *Vanadium Queen Mines*, one of the area's large producers. Louis P. Gaggini is heading the engineering firm.

*T-U Uranium Company*, a corporation headed by L. L. Travis, Texas oilman, has signed joint contracts for uranium ore development with the *Tintic Standard Mining Company*, Salt Lake City, Utah firm. *Tintic* is also active in lead-zinc development in the Eureka mining district of Utah.

*Vician Brothers*, diamond drilling firm of Kellogg, Idaho, has been granted a contract to drill holdings of *U & I Uranium, Inc.* in the Big Indian mining district near Moab, Utah. *U & I Uranium* is the operating company for six Kellogg firms associated in the Utah venture, *Nancy Lee, Signal, Silver Bowl, New Era, Caledonia Silver-Lead*, and *Coeur d'Alene Silver Giant*.

Twenty claims in southern Utah's Green River uranium area will be developed by *Green River Uranium Company, Inc.*, a Washington state corporation organized by the British Columbia firm of *Kaslo Base Metals, Ltd.* *Kaslo* plans to retain 1,000,000 of the authorized 5,000,000 shares of Green River.

*Climax Uranium Company* plans to conduct an exploration and drilling program in the Chinle formation on a section of school land leased from the State of Utah. The section is located six miles southeast of Moab. *Climax* is also continuing its extensive diamond drilling exploration program next to the *Mineral Joe* mine in the Paradox Valley area of Montrose County, Colorado. This drilling is in an area in which the U. S. Atomic Energy Commission has recently announced that it has made major discoveries of uranium in the Morrison formation.

A new United States Geological Survey report on the Henry Mountains region of southern Utah is now available for uranium prospectors. The report describing the region which supports a carnotite mining industry has been published as Professional Paper 228 of the Survey and may be obtained for \$6.25 from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

*Kentucky-Utah Mining Company* has agreed to buy 70 percent interest in the *Plateau Mining Company*, Utah uranium producer, for approximately \$500,000. Some 60,000 feet of diamond drilling has been completed on the Utah properties, 16 miles south of Moab in the Yellow Circle area. Substantial proved reserves of ore have been revealed, according to W. D. Neveker, Jr., president of Kentucky-Utah.

*American Smelting & Refining Company* has applied for mineral leases on 1,021½ acres of state-owned land near Draper, Utah—site of the State Prison. A legal question, whether the state acreage is controlled by the Land Board or by the State Board of Corrections, has complicated the application. A statement from AS&R says that the lease was applied for to test possibilities of an igneous rock mass in the area, in keeping with the company's general exploration policy of prospecting covered areas.

## WYOMING

*Lookout Mountain Mining and Milling Company*, Kellogg, Idaho firm which is developing a zinc-lead property in the Pine Creek, Idaho district, has staked 34 mining claims in southwestern Wyoming. The firm's engineer, Robert M. Gammell, has found placer material there which screen tests indicate would yield one ton of uraninite concentrate from each seven tons of material.

Twelve uranium claims were staked in the Whiskey Mountain area of the Wind River Mountains south of Dubois, Wyoming late in June. Filing the claims at the county clerk's office in Lander were Edwin Rhodes, who made the find, Leslie Luedtke, and William Butkovich. Mr. Butkovich said that the highly radioactive material has been found cropping out along the crest of the Whiskey Mountain.

*Colorado Fuel and Iron Corporation*, Sunrise, Wyoming, has resumed operations on a limited scale after a seven-week layoff at its underground iron mine. Two shifts are now operating four days a week, and the work force has been cut to 190 men. Open pit operations were suspended last year following depletion of high-grade open pit ores.

A rich titanium deposit has been reported 23 miles west of Laramie, Wyoming. Assays at the University of Wyoming Natural Resources Institute show an iron content of 35.5 percent, titanium 28.2 percent, and uranium 0.04 percent. Discovered by Brad Crawford, retired Laramie businessman, and John Hardigan, Albany county rancher, the mineralized dike is reported to be 30 to 40 feet thick, 2½ miles long, with an estimated 3,000 to 4,000 tons of ore at the surface.

## Vanadium Corp. and AEC OK Contract Changes

An amendment to the contract of Vanadium Corporation of America with the U. S. Atomic Energy Commission which was entered into in 1953 has been agreed upon by both parties. Under provisions of the new agreement extending the contract into 1958, Vanadium Corporation derives the right to install the necessary equipment to concentrate at its Monument Mine #2, in northeast Arizona, vanadium-uranium ore which heretofore has not been considered as mill grade. Also, to provide the necessary facilities for processing this ore, the Atomic Energy Commission has approved the addition of another roaster and other auxiliary equipment at the company's Durango, Colorado plant. These additions will increase moderately the company's deliveries of uranium to the nation's stockpile.

## Inspiration Takes Lease On Riviera Cu Property

Inspiration Consolidated Copper Company at Inspiration, Arizona, has taken a lease and option on the property of the Riviera Mines Company, according to P.D.I. Honeyman, Inspiration vice-president and general manager.

Riviera Mines was organized last year by W. L. Allison, president of Alison Steel Company of Phoenix, to acquire the Christmas mine in the Banner mining district, near Winkelman, Arizona. Later, GSA granted Riviera a three-year contract covering 3,000,000 pounds of refined copper with a floor price of 32 cents a pound, less differentials, and mining and milling operations were placed on a three-shift basis.

Exploration and development work conducted by Riviera attracted Inspiration's interest with the result that the latter company is planning to thoroughly prospect and develop the deeper mineral deposits which may lie in the vicinity of the Christmas mine. A contract for diamond drilling has been let and four drills are currently in operation.

## The Uranium Rush Reaches Nevada Mining Districts

Uranium exploration in Nevada is underway at many points in the state. Prospectors are busy and many claims are being staked in almost every county. In three districts, well planned and adequately financed explorations programs are under way.

The Westvaco Chemical Division of Food Machinery & Chemical Corporation has started diamond drilling at its leased Rundberg uranium claims five miles south of Austin, Nevada. The Rundbergs found autunite and torbernite mineralization while on a prospecting trip. They submitted samples to the Atomic Energy Commission which confirmed the existence of uranium. Subsequently Westvaco optioned the claims, established field headquarters in Austin, and engaged Boyles Brothers diamond drilling company of Salt Lake City, Utah to do the drilling. W. A. Young is Westvaco project engineer, and W. C. Peters, field geologist, with headquarters in Austin.

Nye County is the scene of great activity with reports of discoveries at Coal-

dale, Round Mountain, and Belmont. The Gold Metals Consolidated Mining Company of Tonopah reported that it has acquired the Nighthawk and 17 adjoining claims in the Belmont district and that exploration has started. Drilling and prospect pitting is planned for uranium near Coaldale by Young and Critchlow Geophysical Company of Portland, Oregon. The firm purchased 160 acres of patented land from Esmeralda County, Nevada for \$962.00 where the United States Geological Survey reported "a small deposit of uranium-bearing rhyolitic tuff exposed at the northern end of the Silver Peak Mountains," in Survey Circular 291.

The Goldpoint district in western Esmeralda County is also in the uranium news with widespread claim staking in the Goldpoint-Hornsilver area. Most of the staking has been done by Angelo Patricola and associates from Los Angeles, California. Uranium mineralization has reportedly been found on the gold claims of the late August Anderson.

Exploration is continuing at the state's first uranium project by the Nevada Uranium Company in Rocky Canyon 25 miles east of Lovelock. Underground exploration has been under way for more than a year. Ed Bottomley, company manager, recently reported discovery of low-grade mineralization in the Lincoln Hill area near the famous old gold-silver camp of Rochester.

## Calumet & Hecla Enters Southwest Uranium Field

Calumet & Hecla, Inc. of Calumet, Michigan is reported to have signed an agreement with the Canoncito Uranium Corporation of Albuquerque, New Mexico, to prospect and develop 16,000 acres of land on the Canoncito Navajo reservations 25 miles west of Albuquerque.

Under the agreement, Calumet will start immediately on a \$300,000 prospecting and core drilling program. Royalties will be paid to Canoncito Uranium and then to the Navajo tribe if production gets underway.

Canoncito holds a prospecting permit on the area which is 15 miles long and about three miles wide. The area is immediately east of Anaconda Copper Mining Company's uranium operation on the Laguna Indian reservation.



Erle P. Halliburton has reported the completion of purchase of the Clarkdale smelter and townsite of Clarkdale, Arizona, on which he has held options since last January. Mr. Halliburton proposes to quarry, crush, grind, and blend limestone at the site, and to manufacture cement in two plants, one in Clarkdale and one in Phoenix. Plans call for the delivery of raw material as a slurry in Phoenix through a 110-mile pipeline. The Clarkdale smelter and townsite were purchased last year from Phelps Dodge Corporation by W. L. Allison of Phoenix, who, in turn, has consummated sale of the properties to Mr. Halliburton.

Penn-Texas Corporation's newly formed affiliate, Penn-Uranium Corporation, is reported to have purchased all outstanding stock of the A and B Mining Company, along with the latter's leases which cover uranium rights on about 2,000 acres of the Navajo Reservation near Flagstaff, Arizona. The corporation is



## Illinois Zinc Reopening Mines in Southwest

Illinois Zinc Company is reopening the Kearney zinc mine near Silver City, New Mexico, pictured above. Closed since January 1953, the mine had been producing about 880 tons of zinc concentrate per month at the time of its shutdown, or about 500 tons of refined zinc. The improved zinc price is said to have enabled the company to resume operations. Illinois Zinc's subsidiary, Shannon Mining Company, is reopening the old Shannon mine near Tombstone, Arizona. A former copper producer, the new operators are interested primarily in the property's lead and zinc potential. Initial work is at the 600-foot Pemberthy shaft where concrete foundations are being poured for hoist, compressor, and pumps. The mine is to be de-watered to the sixth level, a complete examination of underground workings made, and then a program of underground diamond drilling will be initiated. Electric power will be supplied under contract with the Sulphur Springs Valley Electric Company. J. W. Faust is the engineer in charge.

also said to be negotiating for 22,000 acres on and adjoining the reservation.

**Banner Mining Company** has completed its 400-ton copper mill at its *Plumed Knight* mine southwest of Tucson, Arizona. Banner is reported to have found an extension of the *Pima Mining Company's* ore body on its ground. Also a new discovery of oxidized copper ore which changes to sulphide at depth has been encountered in the *Daisy* claims west of current operations. Banner has a DMPA contract for production and sale of 12,960,000 pounds of copper at 31 cents a pound, f.o.b. mid-western markets.

About 800 tons of manganese ore have been shipped to the Wenden Depot from the *Black Diamond* mine and shipments are continuing at the rate of 20 tons daily. The ore is said to average about 30 percent manganese. The *Black Diamond* is located six miles east of Cibola Lake in Yuma County, Arizona and is owned and operated by Gibson Brothers of Roll, Arizona. Fifteen men are employed. A portion of the *Black Diamond* property is leased to Allen and Todd who are working a crew of five men. They have stockpiled about 400 tons of ore at the mine and are awaiting completion of a new road before shipping to the Wenden purchase depot.

The *Wothree Mines*, operating the *Williams* tungsten mine in Mohave County, Arizona, have completed the remodeling and enlarging of the milling plant and have made several shipments of tungsten concentrates to Bishop, California. A crew of 30 men is regularly employed under the direction of George B. Blonsky of Kingman, Arizona.

Don Lieberman of Tucson, Arizona, is reported to have acquired the *Good Enough* tungsten mine, 10 miles northwest of Arivaca, in the Las Guijas district. The ore at the *Good Enough* is wolframite and huebnerite, and the property is equipped with a small mill capable of making a rough concentrate.

A potential copper development exists in the White Mesa area of the Navajo Reservation in Arizona, reports the University of Arizona geologists who surveyed the area for the Indian Bureau. An estimated 16,000,000 tons of proven copper ore are available in the Mesa, said Prof. George A. Kiersch, in charge of the mineral resources survey. The deposit is about 19 miles from the site of the proposed Glenn Canyon Dam on the Colorado River, which could provide water for any operation. The report also listed other potential copper development channels in the Paikite, Nakai, and Copper Canyons, and in the Monument Valley region of Utah and Arizona.

Four of the 12 largest firms paying highest taxes in Gila County, Arizona were mining companies. Top taxpayer was *Insiration Consolidated Copper Company* which paid \$290,337.34. Others were *Miami Copper Company*, *Kennecott Copper Corporation*, and *American Smelting and Refining Company*.

The *Ray Mines Division* of *Kennecott Copper Corporation* at Ray, Arizona, mined and milled 5,567,150 tons of ore in 1953, the ore assaying 1.018 percent in copper compared to 1.096 percent in 1952. Copper production amounted to 47,246 tons. Ore production at the Ray Mines Division has practically doubled within the last four years as a result of the conversion of the mine from an un-

derground to an open-pit operation. In 1950 total ore production was 3,056,425 tons, with 1,400,000 tons coming from underground workings and 1,600,000 plus tons from the open pit. In 1953, the comparison was 900,000 tons of underground ore and 4,700,000 tons of ore from the open pit.

Edward B. Clark is doing development work on his two five-acre tracts near Congress, Arizona. Electricity will be supplied by the Arizona Power Company. He reports that he has a good showing of copper on which he plans to sink soon.

The *Riviera Mining Company* is now milling 215 tons per day in its concentrator near Winkelman, Arizona. The company has a contract with the government to produce 3,000,000 pounds of copper at 32 cents. *Riviera* acquired a lease on the *Christmas* mine last July and started milling in October. Approximately 150 men are employed at the property and production for 1953 totaled 600,000 pounds of copper. George Freeman is general manager and Sam Knight is mill superintendent.

The *Athletic Mining Company* is mining and milling approximately 100 tons of ore per day from its *Head Center* mine in the Aravaipa mining district of Graham County, Arizona. The mine is working one shift and the mill three shifts daily, five days per week. The ore is said to average from 11 to 12 percent zinc and from 9 to 10 percent lead, with a small amount of copper. About 12 tons of zinc concentrates are obtained from the ore for every 9 tons of lead concentrates. Lead concentrates are shipped to the American Smelting and Refining Company smelter at El Paso, Texas. In the future, zinc concentrates probably will go to ASARCO's Amarillo, Texas, retort plant as the *Athletic* company's zinc smelter in Arkansas is closed. Additional development work will be undertaken shortly to build up ore reserves. The mine and mill crew consists of 23 men working under the direction of Harvey Horton, manager, of Safford, Arizona; Elton Kidd, mine superintendent, Klondyke; and Borden Burleson, mill superintendent, Klondyke.

Currently producing manganese ore for the Wenden (Arizona) stockpile, are the *Blackjack* mine, the *Manganese Canyon* mine, and other leases in the vicinity of the *Arlington* group 25 miles from Blythe, California. Several small mines in the area, including the *Burro* and *Tadpole*, are supplying ore to a small concentrator located four miles north of Palo Verde. The concentrate is then transported to Wenden.

The *Dasco Mines Corporation* has been formed in Yuma, Arizona, to operate several properties in western Arizona. Their mines include the *Doyle Vanadium*, *Southern Cross*, *Climax*, *Butler*, and *Little Giant*. President of *Dasco* is Robert N. Doyle of Vista, California.

A portion of the *Mineral Segregation of the Baca Float* has been sub-leased to the *M. M. Sundt Construction Company* of Tucson, Arizona. The new operators are said to be planning extensive mining operations and have already started work at the property, cleaning out an old shaft and an old adit and preparing to construct a mile of new road. The *Mineral Segregation of the Baca Float* is located 12 to 16 miles northwest of Patagonia, Arizona, and consists of three separate tracts totaling more than 8,500 acres. The owner is Mrs. Jane Bouldin of Dallas, Texas, and

the lessee is the *Salero Metals Corporation*, J. W. Crotty, president. The *Sundt* sub-lease is said to cover two tracts of 545 and 600 acres, respectively. Ore deposits in the district—the *Wrightson*—contain principally copper with some gold, silver, and lead. Some of the ore is reported to be highly siliceous and can be used as high-silica flux.



*Yuba River Development Corporation* has leased 40 acres and is filing on 40 more in a Bryce Canyon placer project near Brandy City, 14 miles west of Downieville, California.

Marvin Art of Bakersfield, California has located uranium deposits in the Cuyama Valley, northwestern Ventura County, California. Mr. Art has about 15 square miles under claim and is busy filing more. The United States Atomic Energy Commission has confirmed that the deposit contains uranium.

The research and development division, and laboratories of the *Merrill Company*, a well known metallurgical and engineering firm of San Francisco, California, have been acquired by *Arthur D. Little, Inc.* The laboratories will now be known as the Western Laboratories Division of *Arthur D. Little, Inc.* and will make research and product development by ADL conveniently available to West Coast industry.

*Johns-Manville Corporation* plans to build a new plant for manufacture of synthetic silicates adjacent to its present plant at Lompoc, California. The new addition is expected to be completed and in operation within about 18 months. J-M now quarries diatomite at Lompoc, from which the synthetics will be made.

*Willow Valley Mines, Inc.* has completed a 375-foot raise through to the surface to serve as a second exit for personnel and also for ventilation of the mine. The company operates a gold mine near Nevada City, California. Additional compressor capacity will now be added, two shifts in the mine will be maintained, and production increased.

*Kaiser Aluminum & Chemical Corporation's* dolomite quarry and plant at Natividad, California has been named the nation's safest operation of its kind and class by the National Lime Association and the U.S. Bureau of Mines. The award was based on 389,212 continuous accident-free man-hours between December 1950 and January 1954.



*Kennametal, Inc.'s Nevada Scheelite Division* reports an increase in its mining and milling operations near Rawhide, Nevada during the last few months. Mining has been continuing steadily on the 300 level, but for some time ore has also been coming from the 400 level. Diamond drilling has indicated addi-



tional ore to the 500 level and the firm is preparing to sink a winze from the 400 to the 500. At the mill, production has increased from 90 tons a day to 120 tons a day.

About 2,800,000 tons of tailings at Millers, Nevada, about 15 miles northwest of Tonopah, have been purchased by a new firm—*Millers, Inc.* The tailings are from former operations of the *Tonopah Mining Company* and the *Tonopah Belmont Company*. They were purchased from *Technical Operators*, and included in the transaction were 1,200 acres of patented land on which the tailings lay, and water wells. The new group will build a 500-ton unit for treatment of the tailings, and a 10-ton unit to handle ore (lead, silver, copper, and tungsten) from the *Florence* and other mines which the firm is acquiring. *Millers, Inc.* was formed by Ira Jacobsen, Willis Simpson, and Charles H. Chandler, who were previously organized as *Esmeralda Extraction Corporation*, and Frank R. Healey and Buford Gill.

Eight Colorado attorneys have recorded 148 certificates of location of mining claims within White Pine County, Nevada. The claims cover about 23,560 acres in Spring Valley and the Taylor mining district. The locators are: Robert L. Johnson, Haver T. Lentz, Arthur K. Underwood, Jr., Michael E. Reidy, Samuel S. Sherman, Jr., John W. Low, and Harold E. Popham, all of Denver, and Winston S. Howard of Littleton, Colorado.

High-grade fluor spar is being shipped from the *Charles Ctrac* mine in Cox Canyon 20 miles north of Stillwater, Nevada, to the *Kaiser Aluminum & Chemical Corporation* mill west of Fallon, Nevada. A tunnel is in 500 feet and it is planned to stoop from this tunnel, and also to sink a winze. C. J. Brackney and Jim Ryan are operating the mine.

New Mexico Mining Association, Box 1068, Carlsbad, enclosing a deposit of \$5 per room.

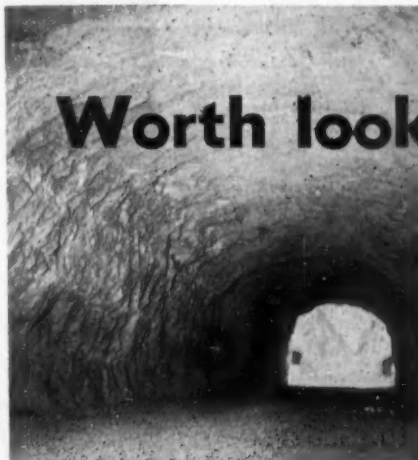


Clay Mineral Technology is the theme of the Third National Clay Minerals Conference to be held at Rice Institute, Houston, Texas, October 27 through 29. The Clay Minerals Committee of the

National Research Council is sponsoring the event.

*Lone Star Steel Company* at Lone Star, Texas, has curtailed production at its blast furnace and shut down its iron ore mines because of "an extremely heavy inventory of pig iron." In addition, the company has closed its iron ore beneficiation plant, cut coke and oven gas production by half, and reduced some related service departments.

*Lone Star Sulphur Corporation* has completed its \$800,000 plant at the Long Point dome in Texas, and pumping operations have started. Initial production will be from 400 to 500 tons daily, using the Frasch process.



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Glen V. Slater had to close down his placer operations near Petaca, New Mexico, for a time because of a low water supply. Mr. Slater recovers columbium and tantalum by placer and sluice box operations.

Santa Fe, New Mexico interests are reported to be planning to operate the *San Pedro* copper mine near Golden, which was active during World War II.

The *Anaconda Copper Mining Company* has been granted a certificate of necessity for accelerated tax amortization for its new uranium ore processing facilities at Bluewater, New Mexico which are described as the first feature of this issue of *MINING WORLD*. The certificate covered \$3,200,000 of Anaconda's own funds of which 80 percent allowed for the fast tax write off.

The annual convention of the *New Mexico Mining Association* and the *Southwestern International Mining Association* will be held in Carlsbad October 14 through 16. Requests for hotel accommodations may be made by writing to the Hotel and Housing Committee,

## Uranium Companies

(Continued from page 55)

### SOUTH DAKOTA

#### EDGEMONT MINING COMPANY

Managers: Art Ludwig, E. J. Brockman  
Owners: Ray Ludwig, Englewood, Colorado;  
Art Ludwig; E. J. Brockman; Walter D. Jorgensen, Aurora, Colorado; Grady Maples;  
Englewood; Richard Simon, Englewood  
Extensive core drilling completed

### UTAH

#### ABSARAKA URANIUM, INC.

Salt Lake City, Utah  
President: Arlin Davidson; Vice President:  
Allan Mecham; Secretary-Treasurer: Leon  
Newren

#### URANIUM DIVISION, ALPINE URANIUM COMPANY

Spokane, Washington  
19 claims in Grand and San Juan Counties,  
Utah

Road building completed; exploration planned

#### AMURANUM COMPANY

Washington, D. C. and Moab, Utah  
Chairman of the Board: Peter Ansberry;  
President: William H. Watters; Vice President:  
Louis Doerr; Consulting Geologist: Melvin  
Swanson

Claims in Colorado Lisbon fault, Big Indian  
area, San Juan County, Utah  
Core drillings under way

#### APACHE URANIUM CORPORATION

Salt Lake City, Utah  
President: Ben C. Rich; Vice President:  
Elden J. Facer; Secretary: Douglas Thompson

#### ARROW URANIUM CORPORATION

Claims in Indian Creek district, San Juan  
County, Utah  
Drilling to begin soon

#### ATLAS URANIUM CORPORATION

Salt Lake City, Utah  
President: J. C. Burgers; Vice President:  
J. Fred Pingree; Secretary: T. L. Christiansen

#### ATOMIC URANIUM, INC.

Salt Lake City, Utah  
President: C. E. Hicks; Vice President:  
Samuel Bernstein; Secretary-Treasurer: Louis D.  
Tannenbaum

#### BLACKJACK URANIUM COMPANY

Salt Lake City, Utah  
President: S. Grover Rich, Jr.; Vice Presi-  
dent: J. W. Williams; Secretary: Ferrell Adams  
CALIFORNIA-UTAH PETROLEUM & URA-  
NIUM COMPANY

President: Frank Wells, Moab, Utah, Vice  
President: Harry Hanson  
218 claims in Emery and San Juan Counties,  
Utah and Montrose County, Colorado

#### COLOTAR URANIUM COMPANY, INC.

President and General Manager: William G.  
Bush, Lovington, New Mexico  
Claims in Uintah County, Utah

#### COMANCHE URANIUM COMPANY

Salt Lake City, Utah  
President: Gerald B. Higgs; Secretary: James  
J. De Bry

11 claims, option to purchase 26 tracts

#### COMSTOCK URANIUM & OIL CORPORATION

Salt Lake City, Utah  
President: Samuel A. Wahsh; Vice President:  
Malcolm A. Keyser  
30 claims in Emery County, Utah

#### CONGO URANIUM COMPANY

Salt Lake City, Utah  
President: Jay W. Jacobson  
Mine in Circle Cliff area, Garfield County,  
Utah

40-foot shaft sunk. Plans for sinking of  
shaft to additional depth on vein to 100-foot  
level

#### DOVE CREEK URANIUM COMPANY

Dove Creek, Colorado  
Owners: Frank Eggers, Thomas Jackson,  
Everett Robinett, Lee and Frank Snyder  
Holdings in San Juan County, Utah

#### FEDERAL URANIUM CORPORATION

Moab, Utah  
President: Reed Brinton  
47 Claims in Lisbon Valley, Utah

#### GREEN RIVER OIL & URANIUM COMPANY

President: F. M. Kelly, Salt Lake City, Utah  
Properties in San Miguel County, Colorado  
and San Juan County, Utah

#### HERCULES CLAIMS

San Juan County, Utah  
Owners: Bill Shearer, Floyd Provo and John  
Dinsmore

#### INDIAN CREEK URANIUM & OIL CORPORATION

Moab, Utah  
President: O. C. Larson; Vice President:  
Kenneth Taylor  
General Manager & Director: Robert H. T.  
Dunsmore

#### INLAND URANIUM, INC.

Salt Lake City, Utah  
President: Harden W. Breinholt  
Properties in Uintah County, Utah

#### JOLLY JACK URANIUM COMPANY

Utah  
President: Charles W. Nash; Vice President:  
James D. Hadreas; Secretary-Treasurer: Ernest  
C. Psarras; General Manager: A. D. Morgan

#### KANAB URANIUM CORPORATION

Kanab, Utah  
President: C. Whitney Parry, Kanab, Utah;  
Vice President: E. R. Callister, Jr., Salt Lake  
City, Utah; Secretary-Treasurer: Kenneth  
Chamberlain; Directors: N. G. Morgan, Jr.  
and David Freed

Leases on fee lands in Kanab area

#### LAVANDER URANIUM CORPORATION

Utah  
President: George E. Bridwell

#### ORE MINING DIVISION, LEHIGH VALLEY COAL CORPORATION

120 Wall Street, New York 5, New York  
Negotiating for properties in Colorado  
Plateau, Utah, Wyoming, Florida, Canada, etc.

#### LISBON VALLEY URANIUM COMPANY

Box 186, Denver, Colorado  
Chairman of Board: James M. Knowles;  
President: Wilder H. Brinton; Vice President:  
Jack Hoskinson; Secretary-Treasurer: Melvin  
F. Schroeder

Claims in San Juan County, Utah—Alpha  
#1-10, KB #1-16, Lucky Star, and Lucky  
Strike

#### MESA URANIUM COMPANY

Grand Junction, Colorado  
President: Cecil L. Turner  
6,840 acres in Gateway mining district,  
Grand County, Utah

#### OTIS OIL AND GAS CORPORATION

624 U. S. National Bank Building, Denver,  
Colorado

President: Otis A. Roberts  
Eleven uranium claims, Grand County Utah  
Geologic survey preparatory to diamond  
drilling

#### PIONEER URANIUM COMPANY

Moab, Utah  
President: Dan O'Laurie; Vice President:  
Robert Barrett; Secretary-Treasurer: Allen  
Darby; Directors: Fred Frazier, Jack Forcey  
and Joseph Ringholtz

#### RARE METALS CORPORATION

Kearns Building, Salt Lake City, Utah  
President: Paul Kayser, Houston, Texas;  
Assistant Manager: Mitchell H. Kline, Salt

#### Lake City, Utah

Leases in Utah, Colorado, Wyoming, New  
Mexico and Nevada

#### ROYAL URANIUM COMPANY

Salt Lake City, Utah  
President and General Manager: George H.  
Patterson

23 claims in southeast Utah

#### SLICK ROCK URANIUM DEVELOPMENT COMPANY

President: Grant H. Wirick, Salt Lake City,  
Utah; Vice President: Walter H. Gramlich,  
Moab, Utah; Secretary-Treasurer: B. A. Hart-  
man, Salt Lake City, Utah

#### STANDARD URANIUM CORPORATION

Moab, Utah  
President: Joseph W. Frazer, New York City,  
New York; Vice President: Aaron Holman;  
Directors: Lucien H. Cullen and Charles A.  
Steen

#### TEMPLE MOUNTAIN URANIUM COMPANY

President: Herman Heinecke, Midvale, Utah  
73 claims in Hansen mining district, Garfield  
County, Utah

#### TRABELLA URANIUM, INC.

Uranium claims, Grand County, Utah. Dia-  
mond drilling

#### U & I URANIUM, INC.

Kellogg, Idaho  
Claims in LaSal area and 20 claim Rocket  
group 15 miles west of Moab, Utah

#### URANIUM EXPLORATION COMPANY

President: Denton B. Chamberlin, Salt Lake  
City, Utah; Vice President: Dean U. Leavitt,  
Marysville, Utah; Secretary-Treasurer: Joe R.  
Brown, Salt Lake City, Utah

#### UTAH-NATIONAL URANIUM MINING CORPORATION

402 Boston Building, Salt Lake City, Utah  
President: R. L. McGillis; Vice President:  
J. B. Hale  
10 claims leased, San Miguel County, Colo-  
rado

32 claims leased, Montrose County, Colorado  
29 claims leased, Garfield County, Utah

#### WESTERN GOLD & URANIUM, INC.

New York, New York  
President: Ralph G. Brown  
Claims in Washington County, Utah

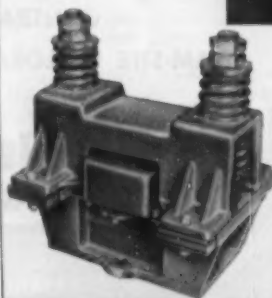
### WYOMING

#### ARROWHEAD URANIUM COMPANY

Grand Junction, Colorado  
Properties in Wyoming

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Speed flow of stub-  
born materials from  
hopper to conveyor  
belt.



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they prevent arching, plugging or clogging of even the  
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## precipitates — NORTHWEST

IDAHO

In the Coeur d'Alene district silver belt south of Osburn, Idaho, a creek level exploration crosscut being driven by *Day Mines, Inc.* and *American Smelting and Refining Company* has been placed on a two-shift basis. The face is in more than 5,600 feet from the portal in Shields Gulch, representing a more than 2,600-foot extension of the old Rainbow adit under an easement from *Coeur d'Alene Mines Corporation*. The bore has passed through the *Triangle* group of claims and is in ground of *Sterling Mines Company*. It will be extended into the *West Fern* claims. Some mineralized veinlets were cut in recent work. Henry L. Day of Wallace, president of *Day Mines, Inc.*, is in charge.

*Lucky Friday Silver-Lead Mines Company* has resumed development work on the bottom, 2,300 level, of the *Lucky Friday* mine east of Mullan, Shoshone County, Idaho. Work was suspended early this year to concentrate on a three-compartment shaft raise. Drifting in ore is proceeding westerly on the *Lucky Friday* vein toward *Gold Hunter Mines, Inc.*, a wholly owned subsidiary of *Day Mines, Inc.* Work on a 2,000-foot level exploration bore into adjoining ground was temporarily suspended in May when work was resumed on the west drift. Dave Elder is mine superintendent.

*Golconda Lead Mines*, carrying on a \$90,000 DMEA program at its *Golconda* mine east of Wallace, Idaho, has encountered ground too wet to handle in easterly drifting along a vein on the bottom 1800 level. A drift is being driven around the area. A shoot of high-grade zinc-lead ore was opened in previous drift work along the structure. Wray Featherstone is mine manager.

Open-pit mining is being conducted by *Salmon River Scheelite Corporation* at the *Tungsten Jim* and *Scheelite Nellie* Tungsten deposits on Thompson Creek, Custer County, Idaho. Initial production is being tested at the *Bayhorse Mill* at Challis. Robert W. Faris of Arco is president, and Jim Clutis of Salmon is secretary-treasurer and mine superintendent for the new firm.

A. C. Milholland of Smelterville and Irvin Jewett and Howard Hunt of Pinehurst are sinking an incline shaft at the old *Lost Cabin* mine near the summit of Fourth of July Canyon west of Kellogg, Idaho. They are following an ore shoot exposed at the portal of an exploration tunnel driven by *Idaho Goldfields, Inc.* of Spokane, with which they hold an operating and royalty agreement. Some high grade lead-silver ore is being stockpiled.

*Goldstone Mining Company* has passed the 2,000-foot point in its new adit into *Goldstone Mountain* near Salmon, Lemhi County, Idaho, and is near its principal objective. The tunnel is being driven to attain 400 feet of depth under old ore stopes. The mine camp was reopened May 15 following a shut-

down last December due to heavy snows and an air compressor breakdown. B. W. Porter of Seattle is president.

Sinking 2,000 feet of three-compartment shaft in about 11 months at its *Crescent* mine, in Shoshone County, Idaho, *Bunker Hill & Sullivan Mining and Concentrating Company* bottomed the shaft at a depth of 3,275 feet. Advance averaged more than nine feet a day in final months. The 3,200 level is to be explored as part of a \$1,090,750 DMEA project. P. C. Feddersen is general manager of *Bunker Hill* at Kellogg.

*New Rainbow Mining Company* has opened a 60-foot shoot of silver-gold-lead-zinc ore in the old *Weber* mine, Lakeview district, Bonner County, Idaho. An east drift along the vein structure is being extended in search of the downward extension of an open-pit ore body which has yielded nearly \$350,000 gross production since 1949 to *Austin-Meyers Corporation*. Robert B. Austin, Wallace mining engineer, is vice president and manager.

MONTANA

*Radon Research Corporation* of Boulder, Montana has been granted a \$34,175 DMEA contract (the government's share is \$26,631) for uranium exploration at the *Red Rock* mine near

Basin, Jefferson County. The uranium-bearing vein is in andesite, a new type of occurrence in the district, overlaying the monzonite of the *Boulder* batholith. Two adits have penetrated the uranium vein and drifting proceeds on ore bodies. Wade V. Lewis of Boulder is president.

*Contract Milling Company* of Spokane, Washington is proceeding rapidly with construction of the new mill on the *Marget Ann* gold-silver-lead-manganese property of *Mitchell Mining Company* at Walkerville in the Butte, Montana area. In the mine the shaft has been deepened and crosscutting is going on on the lower levels.

Laurence Berry is reported to have leased the old *Polaris* mine near Polaris, Montana, and is currently exploring the property by bulldozer.

Several large companies manufacturing mining and construction equipment have donated working models to the Montana School of Mines for use in instruction classes. The *International Harvester Company* of Chicago, Illinois contributed a crawler tractor with attached bulldozer. The *Euclid Division, General Motors Corporation*, of Cleveland, Ohio donated a bottom dump-tractor trailer. A continuous bucket loader and small-scale models of construction equipment were given by the *Barber-Greene Company* of Aurora, Illinois. The *Pennsylvania Pump & Compressor Company* of Easton, Pennsylvania supplied a sample of an "air-cushion" compressor valve. Scale models of a shovel, a self-propelled crane, dragline, a truck-mounted clamshell, and a truck-mounted Magnet were contributed by the *Thew Shovel Company* of Lorain, Ohio. The *Joy Manufacturing Company* of



### Canadian Firm Works Northwest Tungsten Mine

Once again in production is the renovated mill at the *Germania tungsten* mine in the *Huckleberry Range* of southwestern Stevens County, Washington. A Diesel power plant has been installed, and flotation cells, which can be seen above, are awaiting installation. Discovered in 1894, the mine once ranked as America's leading tungsten producer. German interests operated it before World War I. *General Electric Company* extracted considerable ore in the 1930's. *Tungsten Mining and Milling Company* took it over after World War II, and received DMEA approval for a \$34,650 exploration project at the property. However, financial difficulties last year led to the decision to option the property to *Penticton Tungsten Mines, Ltd.* of *Penticton, British Columbia*, present operators of the property. Tungsten-bearing talus material from the hillside above the mill is already being hauled to the concentrator for processing. About 200,000 tons of this material is said to be available. The mill will handle about 100 tons per 8-hour shift at present, with consideration being given to placing the operation on a two or three shift basis if conditions warrant. Frank Eichelberger is general manager, and Carl George is mill superintendent.



Pittsburgh, Pennsylvania donated scale templates of coal mining, loading, and transporting equipment; and the LeTourneau-Westinghouse Company of Peoria, Illinois gave a model of a Tournarocker.



The rise in quicksilver prices has enabled Bonanza Oil and Mine Corporation to reopen its Bonanza mercury mine near Sutherlin, Oregon. The mine had

been closed since March because it was unable to make a profit under those current operating conditions. Prior to that, new ore pockets were blocked off in preparation for mining and processing.

The Sanger gold mine in Baker County, Oregon is being developed by James Muir, Don Olling, Verne Jacobson, and William Wendt. Mr. Wendt, who is owner of the property, prospected a vein several years ago, and then erected a 5-ton test mill last summer. Plans now are to mine and mill ore from a shoot of this vein, and to impound the tailing for future cyaniding.

A. O. Craig of Selma, Oregon is mining chrome ore from a deposit he lo-

cated earlier this year on a ridge between Soldier Creek and O'Connor Creek near Schoolhouse Flat, Josephine County. The ore body occurs in serpentine about 250 feet wide. Float was found on both sides of the ridge and the outcrop was about 3 feet wide by 5 feet long. A road into the property has been built and the ore is being concentrated at the Six Mile chromite mill owned by Roy Jackson and Jean Pressler.

The United States Geological Survey, in cooperation with the Oregon State Department of Mines, is planning to start work on a geologic map of Oregon in the new fiscal year. The map will be published in two parts. A map of western Oregon will be published first because only field checking will be needed. However, extensive field work will be necessary in eastern Oregon.

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Action photographs taken at Chuquibambilla

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SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT



Border Lord Mining Corporation is resuming operations at its German tungsten mine in Okanogan County, Washington. An adequate road into the property still remains the primary task before commercial production can start. In 1953 more than 11 miles of private road were constructed, bringing to 20 the total number of miles of road built. Mill equipment has been installed and a water supply line laid. Most of the equipment has had to be packed in.

An iron mine near Wenatchee, Chelan County, Washington, has been optioned by Washington Nickel Mining & Alloys, Inc. of Seattle to Waddington Mining Corporation, Ltd. of Vancouver, British Columbia. Large tonnages of hematite and magnetite are indicated. The iron ores also contain manganese, chrome, and nickel. Purchase price has been set tentatively at \$4,500,000, with initial payment of \$500,000 to be made after a three-year investigation period and the balance over 10 years on a 10 percent royalty basis.

The DMEA has authorized Grandview Mines, Inc. to proceed with the second phase of its \$34,600 exploration program being carried out at the Dossier-Maki-Lotze properties in northern Stevens County, Washington. The firm is exploring for lead and zinc. Initial diamond drilling of four holes totaling 2,000 feet partially outlined a fairly large body of pyrite containing scattered amounts of lead-zinc mineralization. The DMEA believed this was sufficient to warrant further exploration so an additional 3,200 feet of drilling will be done.

Pacific Northern Minerals Company of Spokane, Washington, has been granted a \$96,000 DMEA loan for exploration of tungsten, lead and zinc deposits in the Rickerside mine near Hyder, Alaska. J. E. Van Gundy represented the firm in negotiations.

Under a recent lease agreement, Silverton Mines, Inc. has taken over exploration and development of the properties held by Clugston Creek Mining Company in Stevens County, Washington. The company has agreed to spend at least \$10,000 a year on the property, with at least three man-shifts per day at

work. Bulldozing operations have started along a vein exposed at the surface of the 11-claim *Big Chief* group. The Clugston holdings cover more than 700 acres of mineral land, including the old *Chloride Queen* mine northeast of Colville, Washington. Glenn L. Fish is president of Silverton, and Thomas LePage is president of Clugston.

*Beavertail Mining Corporation*, Skykomish, Washington, has made a public stock offering to raise funds for mining development work. Louis J. Stiles is secretary-treasurer.

*Northwestern Portland Cement Company* is constructing crushing and loading facilities for a new limestone quarry at Soda Springs in the Little Wenatchee valley, Chelan County, Washington. Two crushers, conveyor system, and truck-loading bunker are expected to be in operation this summer. Plans call for trucking 750 tons of crushed lime rock daily to Winton and then shipping it by rail to the firm's cement plant at Grotto, west of Stevens Pass over the Cascade Mountain range. Diamond drill cores have indicated a 50-year supply of limestone. A Diesel generator of 400-kw. capacity will provide electricity. The firm has spent \$100,000 improving a 10-mile forest service road to the site. Total cost of the project is estimated at \$350,000. Gordon Tongue of Seattle is company president. Jim Halloran will be quarry superintendent.

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## U.S.A. Metal & Mineral Prices

### COPPER:

### LEAD:

### ZINC:

### ALUMINUM:

### ANTIMONY:

### BISMUTH:

### CADMIUM:

### COBALT:

### COLUMBIUM:

### MAGNESIUM:

### MERCURY:

### NICKEL:

### TIN:

### TITANIUM:

### GOLD:

### SILVER:

### PLATINUM:

### ZIRCONIUM:

### METALS

July 13, 1954

Electrolytic. Delivered F.o.b. cars, Valley basis	30.00
Lake. Delivered, destinations, U.S.A.	30.00
Foreign Copper. Valley basis	29.75-30.00
Common Grade. New York	14.00
Tri-State Concentrates, jig, flotation 80% lead, per ton, Eagle-Picher	\$169.85
Prime Western; F.o.b. E. St. Louis	11.00
Prime Western; Delivered, New York	11.50
Tri-State Concentrates, 60% zinc, per ton	\$64.00
Primary 30 Pound Ingots (99% plus), F.o.b. shipping points	21.50
Lone Star Brand. F.o.b. Laredo, in bulk	29.00
(in ton lots) price per pound	\$2.25
Sticks and bars. 1 to 5 ton lots (Price per pound)	\$1.70
97-99%, keg of 550 pounds (Price per pound)	\$2.60
Powder (99.8%). F.o.b. Freeport, Texas	\$75.00
Ingots (99.8%). F.o.b. Freeport, Texas	27.75
Flasks. Small lots, New York	\$280.00
"F" Ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	60.00
Grade A Brands. New York (Price per pound) Prompt delivery	96.50
99.3% + (Price per pound)	\$4.72
United States Treasury price	\$35.00 per ounce
Newly mined domestic. United States Treasury price	90 1/2¢ per ounce
Foreign Handy & Harman	85.25¢ per ounce
Per Ounce	\$84.00-\$87.00
Powder, Flash Grade	11.50

### ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO, F.o.b. mine, Colorado	\$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H.	
	Visual inspection at \$400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0%, \$50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesia). 48% Cr <sub>2</sub> O <sub>3</sub> . 3 to 1 Ratio	\$44.00-\$46.00
	African (Transvaal). 48% Cr <sub>2</sub> O <sub>3</sub> . No Ratio	\$31.00-\$32.00
	Turkish. 48% Cr <sub>2</sub> O <sub>3</sub> . 3 to 1 chrome-iron ratio	\$49.00-\$50.00
	U. S. Government are purchase depot Grants Pass, Oregon. Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr <sub>2</sub> O <sub>3</sub> and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr <sub>2</sub> O <sub>3</sub> .	
	At United States small lot beryl purchase depots. \$3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus.	
COLUMBIUM-TANTALUM ORE:	Lake Superior. Per gross ton Lower Lake Ports	\$9.90
IRON ORE:	Mesaabi, Non Bessemer, 51.5% Fe. Second quarter	\$10.05
	Mesaabi, Bessemer, 51.5% Fe. Second quarter	\$10.15
	Old Range Non Bessemer, Second quarter	\$10.30
	Old Range Bessemer, Second quarter	\$10.30
	Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00
MANGANESE ORE:	Metallurgical grade, 48 to 50% Mn. Long ton unit	\$1.05-\$1.07
	Metallurgical grade, 46 to 48% Mn. Long ton unit	\$0.95-\$1.05
	Metallurgical grade, 45 to 48% Mn. Long ton unit	\$0.85-\$0.95
	Chemical grade, 80% MnO <sub>2</sub> . Per ton	\$70.00
	Domestic U. S. Government are purchasing depots: Daming, New Mexico; base price \$2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of \$8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ore) base price of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of \$6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS <sub>3</sub> F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	Domestic, 60% WO <sub>3</sub> Per short ton unit	\$63.00-\$65.00
	Foreign, 65% WO <sub>3</sub> Per short ton unit (Schellite)	\$25.00
	Foreign, 65% American, Spanish, Portuguese	\$23.00
URANIUM ORE:	Carnotite-Rascocite. F.o.b. purchase depot plus \$0.06 per ton mile (\$6.00 maximum). Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, Moab, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained U <sub>3</sub> O <sub>8</sub> plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.30 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	Carnotite-Rascocite. V <sub>2</sub> O <sub>5</sub> in ratio of more than 10 parts to 1 part of U <sub>3</sub> O <sub>8</sub> are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, Shiprock, and Bluewater	Per Pound V <sub>2</sub> O <sub>5</sub> \$0.31

### NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	\$12.50
FLUORSPAR:	Oil Well grade. Packed in 100 pound paper bags	\$14.00
	Metallurgical grade, 70% effective CaF <sub>2</sub> content per short ton F.o.b.	
	Illinois-Kentucky mines	\$42.50
	Mexican, 70% f.o.b. border	\$25.00
	European, Atlantic Ports, 70%	\$27.00
	Acid Grade, 97% CaF <sub>2</sub> F.o.b. Kentucky, Illinois, Colorado	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
SULPHUR:	Plaster grades. Crushed and sized. F.o.b. plants	\$7.00 to \$9.00
	Long ton, F.o.b. Hoskins Mound, Texas	\$25.50
	Export	\$30.50

## LONDON METAL AND MINERAL PRICES

July 13, 1954

Per Long Ton USA Equivalent cents per pound<sup>a</sup>

COPPER	Electrolytic, spot	\$239 15s Od	29.97¢
LEAD	Refined, 99.97%	\$96 10s Od	12.06¢
ZINC	Virgin, 99.9%	\$78 5s Od	9.78¢
ALUMINUM	Ingot, 99.5%	\$156 0s Od	19.50¢
ANTIMONY	Regulus, 99.5%	\$222 10s Od	27.81¢
TIN	Standard, 99.75%	\$726 0s Od	90.75¢
TUNGSTEN	Long ton unit, 160s equivalent to		\$22.40

1. With Sterling pound at \$2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

## U.S. Mining Men

(Continued from page 52)

**Mortimer J. Propp** has been elected a director of the Quincy Mining Corporation, copper producer and refiner. He fills the vacancy created by the resignation of A. Devereaux Chesterton.

**James Donald Forrester**, chairman of the department of mining engineering at the Missouri School of Mines and Metallurgy since 1944, has been named dean of the University of Idaho's College of Mines and director of the Idaho Bureau of Mines. Known throughout the mining world for his publications on mining and geology, Dr. Forrester succeeds A. W. Fahrenwald, who has retired.

**S. A. Montague**, president of the Spruce Pine Mica Company, was elected president of the Mica Fabricators Association at the group's annual meeting in Virginia Beach, Virginia. **Arthur A. Bottie**, vice president of the Industrial Mica Corporation, Englewood, New Jersey, and **Peter J. Yannell**, vice president of the Reliance Mica Company, Brooklyn, New York, were elected vice presidents.

**John Q. St. Clair** and **R. J. Crowley** have opened consulting offices in Grand Junction, Colorado. Serving the Colorado Plateau area, their work will include geological investigations and exploration drilling.

**Robert Henderson**, general superintendent of operations at Climax Molybdenum Company, Climax, Colorado, has been appointed to the position of resident manager. Prior to joining Climax in 1936, Mr. Henderson was employed by the International Nickel Company in Canada. From 1948 to 1952 he was project superintendent for the E. J. Longyear Company in Illinois where he directed work on underground propane storage.

**Ralph W. Neyman** was named manager of the Star mine at Burke, Nevada, and **Wallace G. Woolf** was appointed manager of the electrolytic zinc plant near Kellogg at a recent meeting of the Sullivan Mining Company's board of directors. Both men formerly held the position of superintendent at their operations. Mr. Neyman is also general manager of Hecla Mining Company and a director of the Sullivan firm.

**Henry Pollman** has replaced **John Lucas** as mill superintendent of the Silver Bell Mines Company at Ophir, Colorado, and **George Sheahan** succeeds **Glen Smith** as mine foreman at the operation. Both Mr. Lucas and Mr. Smith are now employed by the Four Corners Mining Company.

**Thomas W. Holmes**, former mine superintendent for United States Vanadium Company at Bishop, California, is the new assistant general manager for Mineral Engineering Company, Grand Junction, Colorado. He replaces **Arch Boyd**, who has joined Slaughter Exploration Company in Grand Junction. Heading Minerals Engineering's new contract mining department is **William Lathan**, also formerly at U. S. Vanadium's Bishop mine.

**W. G. Kilbourne** has assumed the general managership of the J. R. Simplot Company's Fertilizer Division, with headquarters in Pocatello,

Idaho. A vice president of the firm, he has been with Simplot since 1946. Recent resignations in the division include **Larry Buhler**, production manager, and **Paul Stocks**, production superintendent at the Pocatello plant.

The following directors of the American Zinc, Lead & Smelting Company, St. Louis, Missouri, have been re-elected: **Eric V. Daveler**, **Alwin C. Eide**, **Edward M. Hamlin**, **Howard I. Young**, and **Richard A. Young**.

**George McAndrews**, general foreman at the Hayden plant, American Smelting and Refining Company, Hayden, Arizona, retired June 30. He had been employed at Hayden since 1915.

**Frank H. MacPherson**, former U. S. Atomic Energy Commission official, has been named manager of the Dulaney Mining Company, Grand Junction, Colorado. Until recently Mr. MacPherson was director of the mining department for the AEC's Grand Junction office and before that was manager of the raw materials office.

**Alvin J. Thull, Jr.** has been appointed assistant to the chief engineer, western mining division, of Kennecott Copper Corporation. In this position, Mr. Thull will help direct the newly created engineering department for the firm in Salt Lake City, Utah.

**Elmer E. Johnston**, president of Silver Dollar Mining Company, Spokane, Washington, was elected to the board of directors of Lincoln Mining Company in Wallace, Idaho. He succeeded **D. D. Anderson**, former Silver Dollar director.

**William T. Griswold**, United Geophysical Company, Inc. official, recently addressed a meeting of the Mining Branch, American Institute of Mining and Metallurgical Engineers, in Los Angeles, California. He described the Pasadena, California firm's methods of locating ore deposits by geophysical methods, specifically the Pima mines, which were developed by United Geophysical as a test for the process.

**Augustus B. Kinzel** assumed his new duties as director of research, Union Carbide and Carbon Corporation, July 1. He will be responsible for the administration and coordination of research activities of all divisions. Dr. Kinzel has been active in research work for the firm since 1926.

**R. R. Kirkon**, assistant superintendent of Pickands Mather & Co.'s Tioga No. 2 mine; **A. A. Olson**, chief electrician at Cleveland-Cliffs Iron Company, Ishpeming, Michigan; **A. H. Seilinger**, superintendent of safety, Colorado Fuel and Iron Company, Pueblo, Colorado; **R. T. Elstad**, president of Oliver Iron Mining Division, U.S. Steel Corporation; and **Dr. J. L. Rosenstein** of the University of Miami were among the speakers at the annual Lake Superior Mines Safety Council which met recently in Duluth, Minnesota.

**Victor A. Zandon** succeeds **R. M. Durland** as refinery superintendent for the Southwest Potash Corporation in Eddy county, New Mexico. Mr. Zandon has been engaged in milling operations throughout the United States and Canada for several years. Prior to his recent appointment, he participated in setting up the milling process for the White Pine Copper project in Michigan.

**J. Frank Sharp** became superintendent of operations for Consolidated Copper Mines Corporation at Kimberly, Nevada, in June. He has been with the company since 1940, and before that time had several years mining experience in the Philippine Islands where he was mine foreman for Consolidated Mines, Inc.

**Fred Stark**, who has been with Kennecott Copper Corporation since 1923, was named smelter general foreman for the McGill, Nevada installations recently.

## OBITUARIES

**John E. Kelly**, internationally known mineral resources consultant, died unexpectedly in his sleep in Washington, D.C., on June 16th. He had just returned from an inspection of the uranium developments in the Moab, Utah, area. Funeral services were held in his hometown of Pittsfield, Massachusetts. He had long been a champion of the domestic mining industry and gained wide-spread recognition for his analysis of the "Paley Report" and the adverse effects its recommendations would have on the domestic mining industry. A gifted writer on subjects from engineering to tax matters, he was a frequent contributor to MINING WORLD.

**Joseph B. Cox**, 83, vice president and director of Sunshine Mining Company of Kellogg, Idaho, died June 12 in Spokane, Washington. A pioneer of the Coeur d'Alene mining district, Mr. Cox was credited with helping found the Sunshine company, as well as playing an active role in the early days of the Sidney Mining Company of Idaho.

**Stanley Walker**, 66, Denver, Colorado mining engineer, died early in June in the kingdom of Nepal, where he had been working on an assignment for the technical co-operative administration. A long-time employee of the U. S. Bureau of Mines, Mr. Walker had been awarded the government's special citation for outstanding service in mine safety development. He was a member of the American Institute of Mining and Metallurgical Engineers.

**Robert W. Newman**, 38, vice president of Cubar Uranium Mines, Ltd. in Ontario, Canada, died of a heart attack shortly after his plane crash-landed near Orillia, Ontario, May 6. A resident of Cleveland, Ohio, Mr. Newman was on his way to the mining camp for an inspection trip.

**W. O. Vanderburg**, former U. S. Bureau of Mines official, died recently at the Bethesda Naval Hospital in Bethesda, Maryland. He had been active in overseas projects of the Bureau for the past several years, most recently serving as chief mining engineer for the European headquarters of the Emergency Procurement Service. Other government defense program assignments took him to South America and South Africa. Mr. Vanderburg also served at the bureau's headquarters in Reno, Nevada for 13 years, during which time he made intensive studies of the mining district and co-authored several pamphlets on the region.



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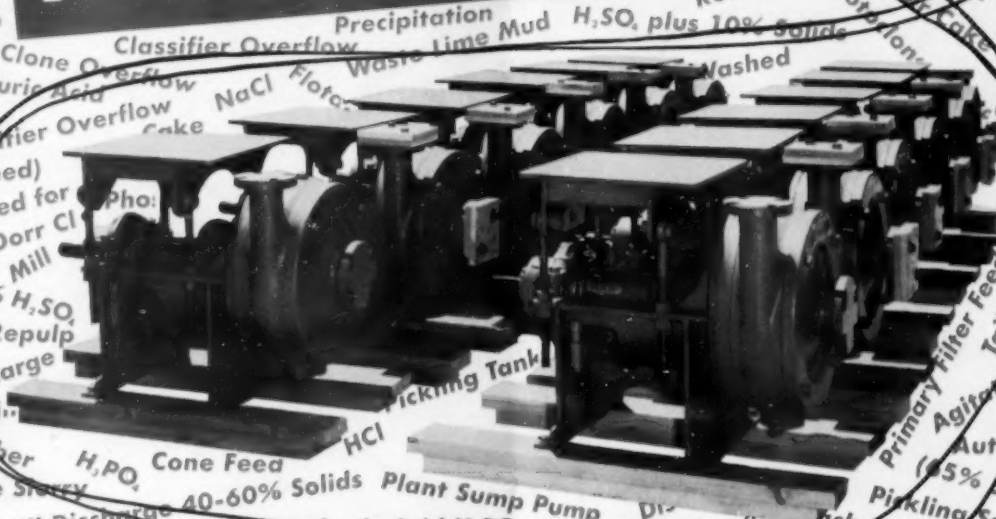
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